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The INDUSTRIAL ARTS MAGAZINE

AUGUST-1923

The Bruce Publishing Company
Milwaukee Wisconsin

ATKINS
SILVER STEEL SAWS

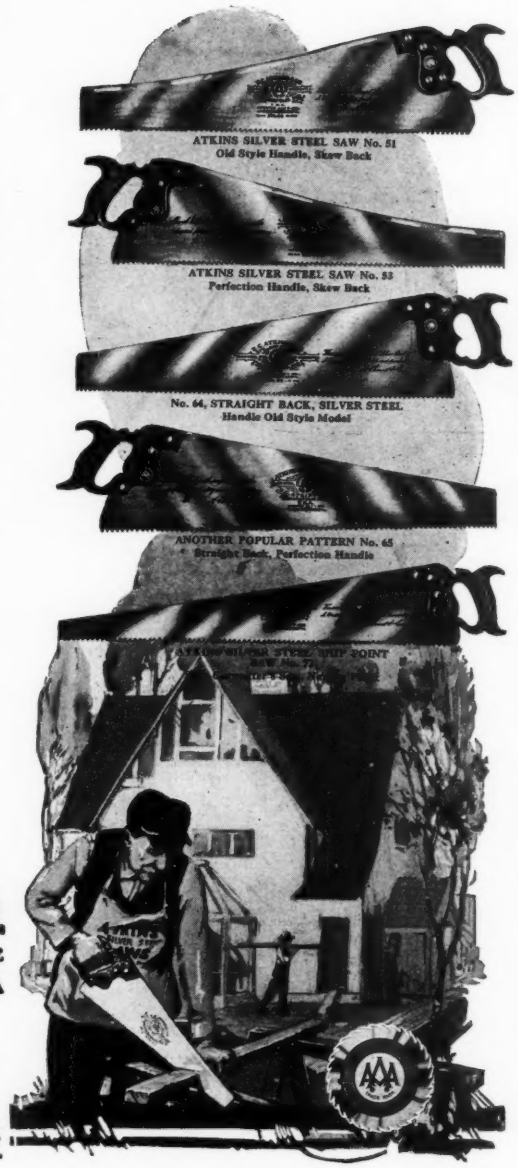
SAW, SAW TOOL, MACHINE KNIFE AND METAL CUTTING EQUIPMENT FOR SCHOOLS

SEND us your specifications for Circular Saws, Band Saws, Scroll Saws, Hand Saws, Compass Saws, Keyhole Saws, Cross Cut Saws, Saw Tools, Braces and Bits; Machine Knives, Matcher Bits, Dado Heads, Groovers, Hack Saw Blades and Frames, Metal Cutting Band and Hack Saw Machines. We are headquarters for all kinds of Saws, Saw Tools, Machine Knives and Metal Cutting products.

Literature descriptive of any item named above will be sent you on request. Write to our nearest factory or branch house and learn more about,

"A Perfect Saw For Every Purpose"

Ask for "Saw Sense," "How To Care For And Use Cross Cut And Hand Saws," also "Saw Fitting For Best Results."


ATKINS SILVER STEEL SAW No. 51
Old Style Handle, Skew Back
ATKINS SILVER STEEL SAW No. 53
Perfection Handle, Skew Back
No. 64, STRAIGHT BACK, SILVER STEEL
Handle Old Style Model
ANOTHER POPULAR PATTERN No. 65
Straight Back, Perfection Handle

E.C.ATKINS & CO.

ESTABLISHED 1857 THE SILVER STEEL SAW PEOPLE

Home Office and Factory, INDIANAPOLIS, INDIANA

Canadian Factory, Hamilton Ontario
Machine Knife Factory, Lancaster N.Y.

Branches Carrying Complete Stocks In The Following Cities:

Atlanta	New Orleans	Seattle
Memphis	New York City	Paris, France
Chicago	Portland, Ore.	Sydney, N. S. W.
Minneapolis	San Francisco	Vancouver, B.C.

Johnson's Artistic Wood Finishes are very easy to use. Boys in the Fifth and Sixth Grades can use them successfully. Simple instructions are printed on every label. Whenever specific information is desired — do not hesitate to write us. Our Individual Advice Department will gladly help solve your wood finishing problems.

The
PROPER TREATMENT
for
FLOORS, WOODWORK
and
FURNITURE

Johnson's Wood Dye is manufactured in fourteen shades and Johnson's Paste Wood Filler in five shades. All shades of Wood Dye may be easily lightened or darkened. Complete instructions are given on every label. By lightening, darkening and intermixing, hundreds of different shades are easily obtainable.

FREE - Book on Wood Finishing

THE finishing of manual training models is assuming more and more importance every year. Surely it is a subject which should be given its share of attention, for a beautiful model may be ruined if improperly finished, whereas the defects of a poorly constructed model are minimized if well finished.

Our Book on Wood Finishing is a valuable text book and should be in the hands of every Wood Finishing Instructor. It is full of information on finishing all wood—soft and hard. It is the work of experts—profusely illustrated in color.

Johnson's Artistic Wood Finishes are economical because they always give satisfaction. The cost of finishing material for an article of furniture is such a small percentage of the entire cost, that the best finish obtainable is none too good. Reliable, high quality wood finishes such as Johnson's are always more satisfactory.

With Johnson's Wood Dye it is both possible and practical to finish up complete turned articles such as lamp stands, candle sticks, etc., while they are still in the lathe. Johnson's Wood Dye penetrates Deeply — brings out the beauty of the grain without raising it in the slightest—dries in four hours and does not rub off or smudge.

JOHNSON'S *Artistic* WOOD FINISHES

Johnson's Artistic Wood Finishes are now being used in nine-tenths of the schools in the United States and Canada. They are particularly adapted for manual training work as they may be applied by the youngest and most inexperienced pupils with good results.

The finishes most popular among Manual Training Instructors and Pupils are:—Johnson's Wood Dye, Prepared Wax, Under-Lac, Paste Wood Filler, Varnishes, Perfectone Undercoat and Enamel. We have a very atractive exhibit of wood panels finished with these products which we are glad to send, free and postpaid, to Manual Training Instructors who will give it wall space in their shops.

All of Johnson's products may be quickly used—models may be finished with Johnson's Wood Dye and Prepared Wax in one period. This is particularly advantageous in crowded centers, and in grade work, where it is necessary to hold the attention of the children. It does away with the necessity of having models laying around to dry.

Johnson's Artistic Wood Finishes are being used all over the world by artisans and amateurs. Architects and contractors specify Johnson's line for coloring woodwork and flooring in new buildings. Painters and decorators use Johnson's Wood Finishes with equal satisfaction on new and old work. Upholsterers, furniture repairers and cabinet makers find it "just the thing" for their use.

S. C. JOHNSON & SON, Dept. I.A. 8, Racine, Wis.,
"The Wood Finishing Authorities"

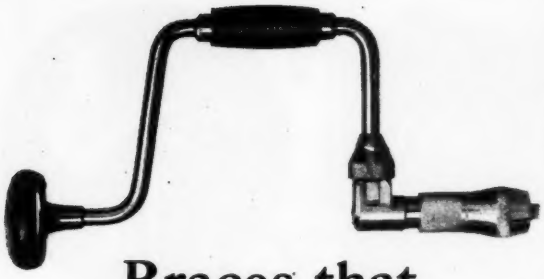
Please send me free and postpaid your authoritative book on Artistic Wood Finishing as applied to manual training work.

We buy stains and varnishes from.....

My Name.....

My Address.....

City and State.....



Braces that stand the gaff of school shopwork

BECAUSE Goodell-Pratt Bit Braces are sturdy, simple in construction, easy to handle, and long-lasting they are preferred by many schools. Every Goodell-Pratt Bit Brace has a steel-clad head that runs on roller bearings concealed in a dust-proof compartment. All handles run in adjustable collars.

The sweeps are made of forged steel with smooth, even bends. These sweeps are larger and therefore stronger than those generally used.

The ratchets are made with heavy dogs—strong and dependable. Each brace has a powerful chuck with two forged steel jaws for holding square shank drills or auger bits. Chuck shells and sockets are of malleable iron, the shells being knurled to afford a good hard grip.

All metal parts fully polished and nickel-plated.

Mr. Punch says: *"A Goodell-Pratt Bit Brace stands the gaff. That's why schools include it in their shop equipment."*

Every school should have our catalog No. 15

In addition to picturing and describing each of our many bit braces, it shows the complete line of Goodell-Pratt 1500 Good Tools. Many of these tools ought to be a part of every school's equipment. The Catalog is free to schools. Send postcard for your copy.

GOODELL-PRATT COMPANY
Toolsmiths
Greenfield, Mass., U. S. A.

GOODELL-PRATT
1500 GOOD TOOLS

THE JOHNSON FRICTION CLUTCH

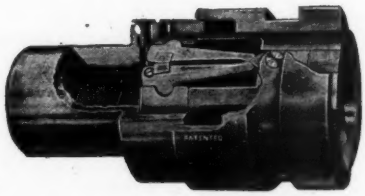
Friction Clutches from Stock

For Use in the Manual Training Departments of Technical High Schools and Universities

Friction Control Means Better Machinery

And the Johnson Clutch is supreme among friction clutches. Adopt it as your standard—always dependable and always promptly obtained.

Complete engineering service to consult on your problems and to handle special installations of any kind.



Single Clutch Broken Away

Write for Catalog "IAM"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

MAYDOLE HAMMERS
THE WORLD'S STANDARD

There are none better made—none better known. When you buy these hammers, you are certain of getting the best. They are used the world over.

Maydole Hammers are made of finest quality material, and guaranteed first-class in every respect.

Write for our booklet of useful information, which every student should have. How many shall we send?

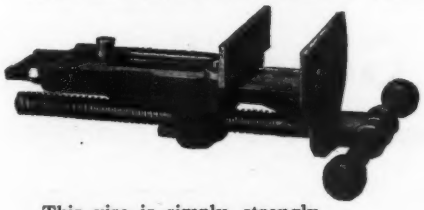
The David Maydole Hammer Company
NORWICH NEW YORK U. S. A.

Vises for every shop in your school

— and they are vises of Columbian quality—sledge-tested—specially designed and priced to meet all manual training school needs.

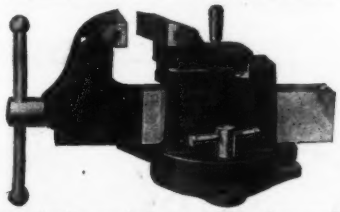
Built into these vises are the many exclusive features which have made Columbian Vises a vital unit in industrial equipment—features which add strength, durability and operative simplicity.

MANUAL TRAINING AND CABINET WORKER'S VISE



This vise is simply, strongly and economically built. Where it is necessary to provide equipment at minimum cost, it presents many advantages.

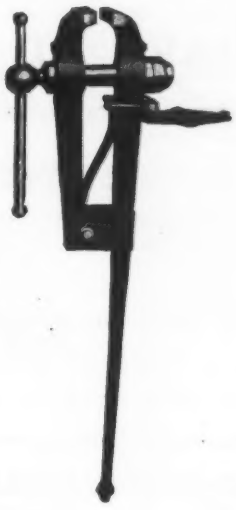
Columbian MALLEABLE IRON MACHINIST'S VISE Adjustable Jaw - Swivel Base



Practically an indestructible vise made from high grade malleable iron. It has removable jaw faces made of high grade tool steel. The screw and handle are cold rolled steel. Ball ends are forged from the solid rod. The ball ends cannot come off and are so shaped that they will not wear or wedge into the screw head.
The effective swivel base arrangement allows the vise to be swung and quickly clamped in any position.

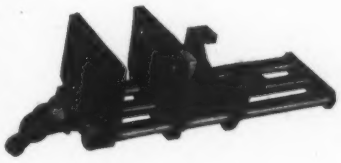
Columbian Solid-box Wrought Steel BLACKSMITH'S SWIVEL VISE

Note the extraordinary depth of throat which makes this vise adaptable to a wide range of work. The open end box makes the screw self-cleaning and minimizes wear on the threads.
The close coupled bench plate on this vise is the simplest, strongest, most rigid bench plate ever devised.



Columbian MANUAL TRAINING VISE Quick Acting

A solidly built and well finished wood-worker's vise for general shop use, particularly adapted to meet the requirements of elementary and high school manual-training departments.



For complete information on above and other Columbian Vises, write for catalogue 1901-A

COLUMBIAN HARDWARE COMPANY

World's largest makers of vises and anvils

CLEVELAND, O.

COLUMBIAN

Sledge-Tested VISES

GRIFFIN
COPING SAW BLADES

Manual Training Instructors

endorse the Griffin Coping Saw Blades, because they have successfully stood the most severe tests. The teeth have a distinct "set" for easy clearance. They are carefully hardened and

have an Unusually Good Temper

ALWAYS SPECIFY "GRIFFIN" Coping Saw Frames and Blades. Your Dealer will supply you—if not, write us.

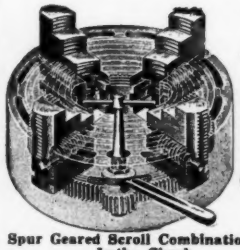
SALES DEPARTMENT

113 Chambers Street NEW YORK JOHN H. GRAHAM & CO. **268 Market Street San Francisco, Calif.**

DURABILITY — ACCURACY — STRENGTH

are striking features of

Westcott Chucks



Spur Geared Scroll Combination Lathe Chuck

They are as essential in the schoolroom as in the commercial shop. The student who learns his trade using the very best of tools and equipment, is sure to benefit in the end.

In the case of chucks— BUY WESTCOTT

Little Giant Double Grip Drill Chuck

Mainly About Your Classes

If you are not using Westcott Chucks now, you should certainly give your boys this advantage. Their best work can only be accomplished on the best equipment. Specify Westcott Chucks on your next order—in the meantime send for our catalogue.

Manufacturers of chucks for every class of work.

WESTCOTT CHUCK COMPANY

Oneida, New York

V&B Braces

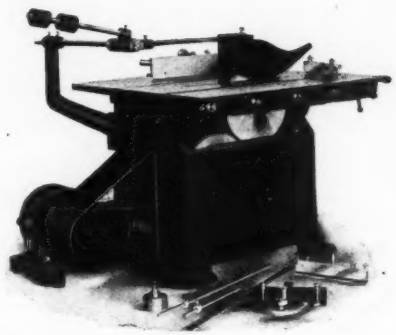
Do you have trouble with your end screw attachment? V & B Braces, with their patented key construction, make such troubles a thing of the past. A quality tool, of course!

VAUGHAN & BUSHNELL MANUFACTURING COMPANY

Makers of Fine Tools

2114 Carroll Ave. Chicago, Ill. U.S.A.

"OLIVER" Universal Saw Bench



A RECORD

"Oliver" Universal Saw Benches have won recognition throughout the World. There are over seventy of them in the City of Glasgow, Scotland, alone. There are over 1000 of them in use in trade and technical schools. There are more "Oliver" Universal Saw Benches in Pattern Shops of the United States than any other make. There are many other records made by

"OLIVER" SAW BENCHES

—earned on merit. They are flexible, universal, convenient, durable, well guarded and Honor Built.

Have you our catalog of

High-Grade Woodworking Machinery?

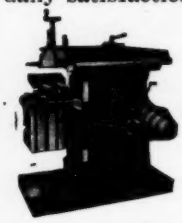
OLIVER MACHINERY CO.

GRAND RAPIDS, MICH.

SHAPERS MILLERS ENGINE LATHES

14"x6'—$400.00
16"x6'— 450.00
With Quick Change Gear Box
$85.00 extra

Moderate price machine tools — practically fool proof — ideally suited for school shops. Thousands in use all over the world giving daily satisfaction.



Descriptive catalogue and full particulars furnished upon request.

Industrial Education Department

THE JOHN STEPTOE CO.
CINCINNATI :: :: OHIO

Broaden the Scope of Your Instruction With These Tools

YOU probably have hesitated giving your pupils certain interesting assignments because of their difficulty without the services of a high speed grinder or an electric drill. Now, with these inexpensive and highly efficient DUMORE grinders and drills available, you need no longer limit the activities of your class when it's a problem of obtaining close limits or doing some difficult drilling. With these adaptable precision tools in your workroom you can broaden the scope of your instruction in countless ways.

If you are interested in shop equipment which will aid *your* pupils to do better and more extensive work, get acquainted with DUMORE tools. Let us tell you why these splendid tools enable even the most inexpert student to turn out creditable work. Write for descriptive literature and prices today —tomorrow you may be too busy!

Wisconsin Electric Co.
6401 Sixteenth Street
Racine, Wis.

No. 1 JG Grinder

Pivots to any angle. Dynamically balanced —Universal motor, operates on A.C. or D.C. Speed, 15,000 r.p.m.

No. 1-BD Hand Drill

Length 12½". Capacity, steel, ¼". Motor, dynamically balanced. Operates on either A.C. or D.C.

DUMORE
HIGH SPEED GRINDERS AND PORTABLE DRILLS

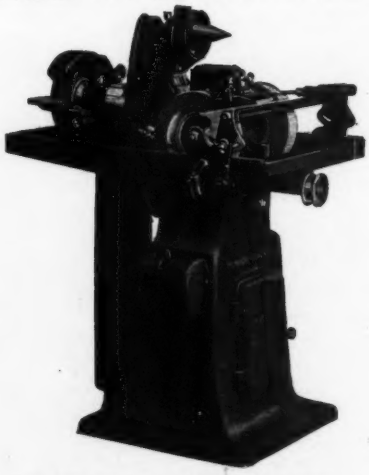
"STAR"
Hack Saws

Always order STAR HACK SAWS—The Blade with a Reputation. We back it up with real sales helps—ask us to prove it!

CLEMSON BROS., Inc.
MIDDLETOWN, N. Y.
Makers Since 1883

MUMMERT-DIXON OILSTONE GRINDERS

The Modern Edge Tool Sharpening Machines
THE STANDARD FOR ALL INDUSTRIAL SCHOOLS



No. 481—Motor or Countershaft Drive.

An automatic attachment for grinding long knives can be furnished with this machine.

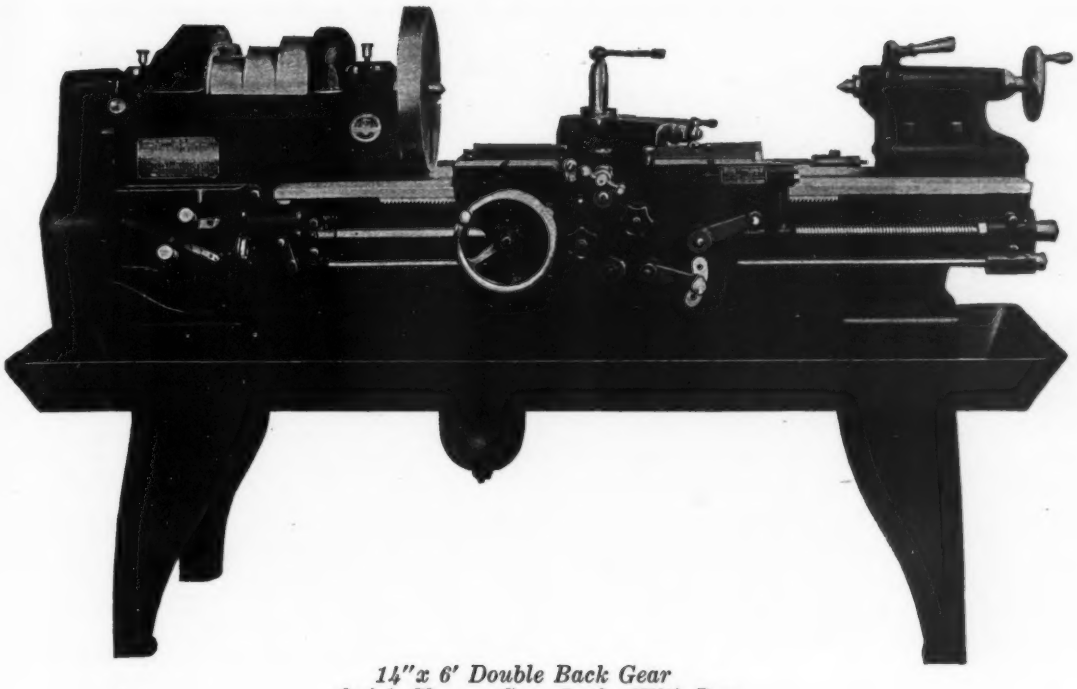
THE FIVE LEADING FEATURES

1. Coarse Oilstone Wheel
2. Fine Oilstone Wheel
3. Grinding Cone
4. Leather Wheel
5. Emery Wheel

ALL AT YOUR FINGERS' ENDS

Send for full descriptive bulletin

MUMMERT-DIXON CO.
Hanover, Pa.



14"x 6' Double Back Gear
Quick Change Gear Lathe With Pan

More Monarch Lathes are being used in manufacturing plants throughout the country than any other make. More Monarch Lathes are being installed in Manual Training Departments of schools than any other make of lathe. The student, upon completion of his school work, will find himself coming in contact with Monarch Lathes in most shops.

Monarch Lathes are built in sizes ranging from 9 inch to 30 inch swing, and bed lengths from 2½′ to 30′.

Our Engineering Department will gladly submit plans and layouts for machine shop installations and we are in position to give Vocational Instructors valuable information and plans, for which no charge is made.

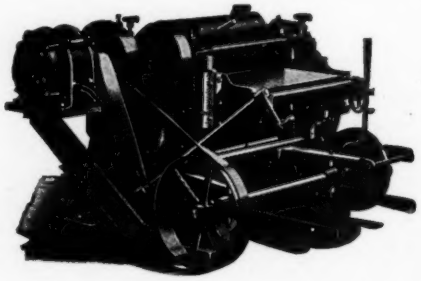
There is a Monarch Dealer near you, who will gladly show you the merits of Monarch Lathes.

Let us send you Special Vocational Bulletin.

THE MONARCH MACHINE TOOL CO.

304 OAK STREET SIDNEY, OHIO

Largest builders of high grade engine lathes and specialist in lathes for Vocational Training.



CRESCENT WOOD WORKING MACHINERY in your wood working department will give the same satisfactory service that the machines are delivering in thousands of factories throughout the world.

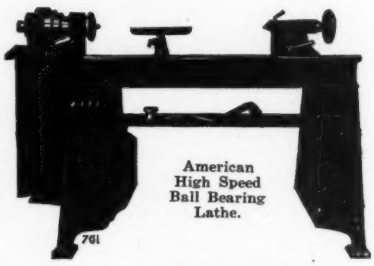
Send today for catalog of band saws, saw tables, jointers, borers, disk grinders, planers, planers and matchers, swing saws, cut off tables, shapers, mortisers, variety wood workers, universal wood workers.

The Crescent Machine Co.

25 Main Street

Leetonia, Ohio, U. S. A.

Make Your School-Shop *SAFE!*



Note the wide margin of SAFETY this American High Speed Ball Bearing Lathe has over the usual lathe. It is designed to meet the demand for a "carelessness-proof" machine. The motor, drive pulleys and belt are inclosed. All hand shifting is eliminated by a sure one handle belt control and shifting device. There is a quick-acting emergency brake on the head stock. Not only unusually SAFE but unusually SURE. Any veteran shop foreman would delight in using this lathe because of its rugged simplicity and unerring "trueness." See to it that your vocational equipment is safe and sure. Write us today for complete specifications.

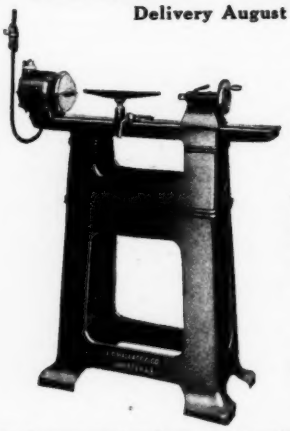
The same safe and sure standards are found in AMERICAN saw benches, jointers, planers, band saws and woodworkers.

American Saw Mill Machinery Company
74 Main St. Hackettstown, N. J.

AMERICAN
MANUAL TRAINING EQUIPMENT

Wallace 6" Bench Lathe

Delivery August 15th



THE last word in portable Lathe construction — and ideal for school work. Operates from any lighting circuit. Single speed, enclosed, direct drive motor, built into head stock, runs at 3400 R. P. M. — the ideal speed for small turning.

Convenient switch control. No belts to shift—perfectly safe.

Has all modern adjustments of tool rests and tail stock. Easily operated and will outstand hard usage.

Wallace Bench Universal Saw
Wallace Bench Plain Saw
Wallace Bench 16" Band Saw
Wallace Bench 4" Planer
Wallace Bench 6" Jointer
Wallace Electric Glue Pot with Automatic Heat Control
Wallace Electric Solder Pot with Automatic Heat Control
Wallace 6" Bench Lathe

Write for Full Information and Prices

J. D. Wallace & Co.

1401 W. Jackson Blvd.,
CHICAGO, ILL.

YOU NEED A HUTHER DADO HEAD

The saw that makes intricate cutting and grooving simple

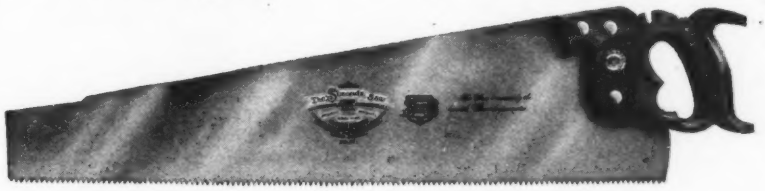
This saw, developed from our own patents, consists of two outside cutters and a sufficient quantity of inside ones to perform the required cut. The outside cutters can be used singly or in pairs as required.

Every builder or contractor, wishing lock corners or any sort of grooving, will find his production costs lowered by this saw.

Write for complete information and prices, or send for one on approval. It may be returned at our expense if unsatisfactory.

HUTHER BROS. SAW MFG. CO.
Rochester, N. Y.

The Best Saws For Manual Training or Vocational Schools



Any woodworking department that is equipped with SIMONDS SAWS—Hand, Circular or Band—has the best cutting service that can be obtained. These are edge-holding saws of the finest steel and workmanship. They cost no more than many inferior saws, and give many times the service. Consider SIMONDS when adding new saws to your department.

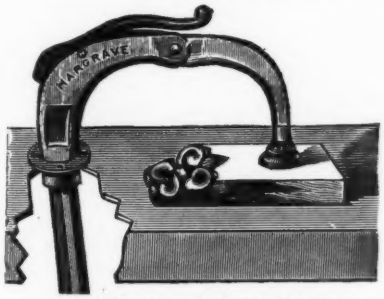
SIMONDS

Saw and Steel Company

FITCHBURG, MASS.
5 Factories

CHICAGO, ILL.
12 Branches

STANDARD CARRIAGE CLAMP.



ADJUSTABLE CARVERS' CLAMP.

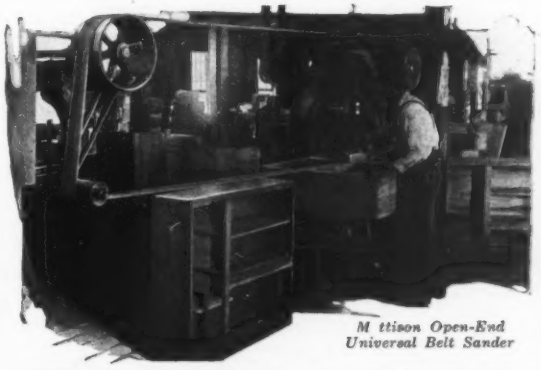
PERFECTION STEEL BAR CLAMP.

Send for catalog showing our complete line. A Clamp for every purpose and many other useful tools.

Ask your dealer for HARGRAVE QUALITY TOOLS

THE CINCINNATI TOOL CO.
Established 1879
Incorporated 1884
Waverley Ave. and C. L. & N. Rv.
CINCINNATI, OHIO

Sanding Assembled Cabinets With Hand-Block Sander



M ttison Open-End Universal Belt Sander

BESIDES providing a genuine machine method for sanding built-up cases, moulded shapes, etc., this Universal Belt Sander will give your boys an opportunity to familiarize themselves with mechanical sanding methods as they actually exist in practically every woodworking factory. If your school shop is not equipped with a Hand Block Belt Sander, you should immediately investigate this machine. We build three different models.

Bulletin 134 shows dozens of interesting operations. Ask for it.

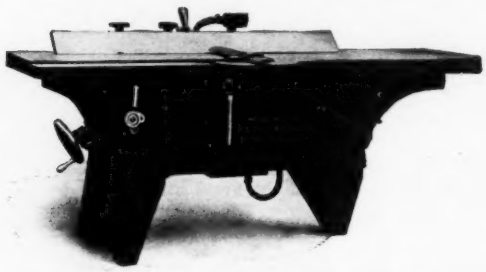
MATTISON MACHINE WORKS
Rockford, Illinois, U.S.A.

CHICAGO GREENSBORO, N. C. NEW YORK SAN FRANCISCO

Established 1847 — Incorporated 1878

Woodworking Machinery

Improved No. 91-A
Hand Planer and Jointer
With Single Bevels to Each Table



Front View of Motor-Driven Machine

The Motor 3600 R. P. M., 60 Cycle,
2 or 3 Phase and Any Voltage.
Machine also made Belt Driven.

Address

H. B. Smith Machine Co.

Smithville, N. J., U. S. A.

Or Nearest Branch
NEW YORK CHICAGO ATLANTA SAN FRANCISCO

UNION PORTABLE

6" Hand Jointer

6" Jointer
16" Band Saw
Universal Saw Bench
Plain Saw Bench
4" Jointer
Single Spindle Shaper
Comb. Universal Saw and 6" Jointer

THEY ARE ON WHEELS
Take the machine to the job

Also Furnished As BENCH TYPE MACHINES.

We recommend machines with the base which makes them conveniently portable.

All machines equipped with suitable motor with convenient switch to start or stop. Any lamp socket acts as your power supply line. Safety provisions have been taken care of to the absolute limit.

Send for Bulletin and Prices

GALLMEYER & LIVINGSTON CO.
SUCCESSORS TO UNION MACHINE CO.
388 Straight St., S. W.,
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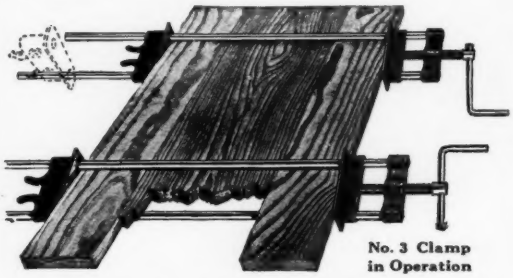

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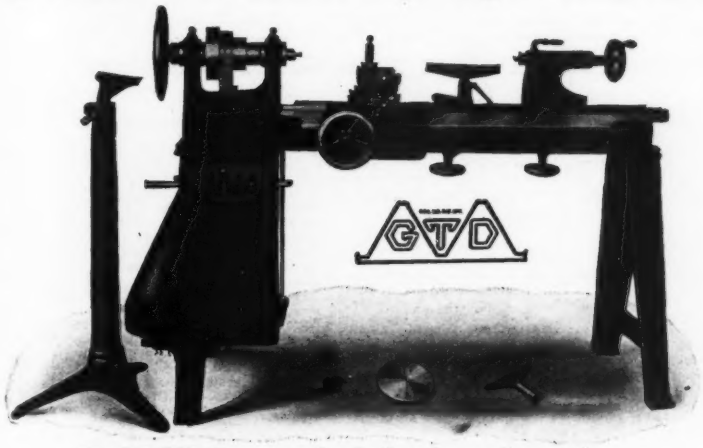

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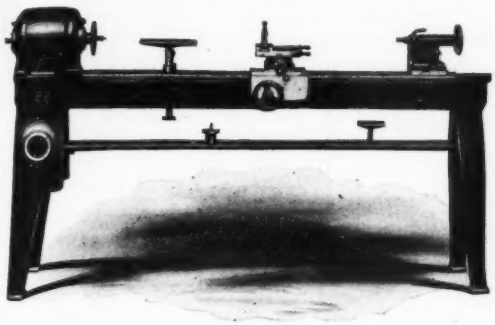

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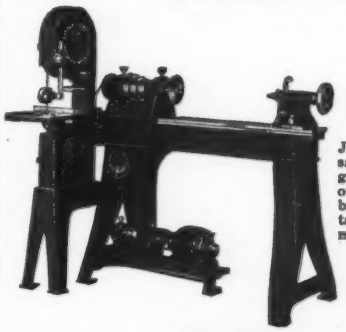

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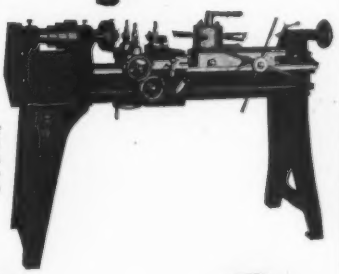

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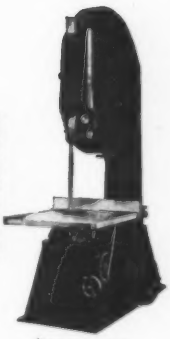

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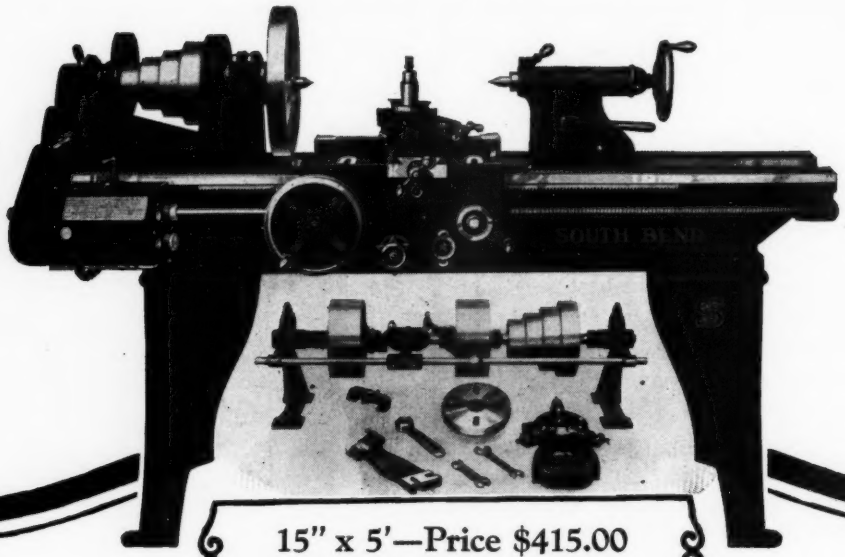

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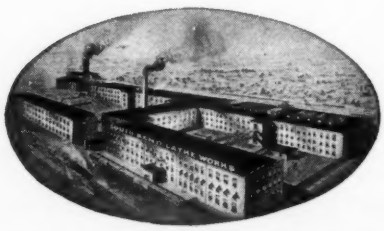

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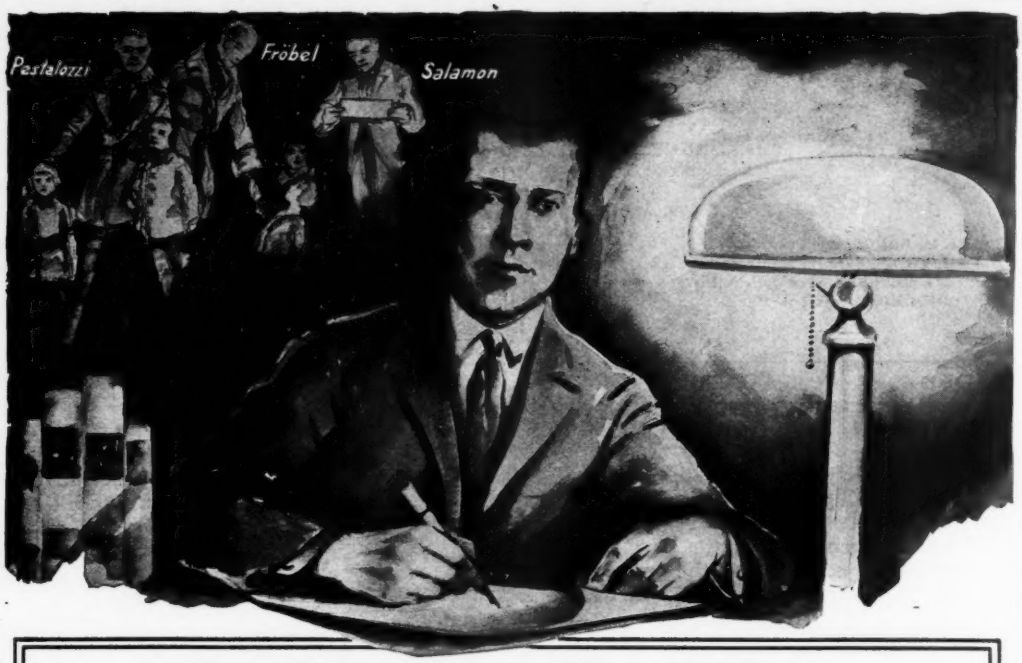


Final Date for Prize Essay Contest Extended to September 10th

A chance for teachers of woodworking or directors of vocational education having under their charge the woodworking or cabinet making departments to write their ideas during the vacation months

Many teachers have expressed the wish that instead of closing our prize essay contest June 1st, we extend it to September 10th in order that they might write their ideas during the vacation season.

This we are glad to do, for nothing shall stand in the way of gathering the greatest collection of ideas on the educational value of woodworking in the training of boys ever assembled.

So, you may write your essay during your vacation days, if you wish, but you must signify before July 1st your intention of doing so. If you are one of those who have already entered the contest and think that this extension of time gives you a chance to write a better essay we will accept another one from you.

Pestalozzi, Fröbel and Salamon, all stars of the first magnitude in the educational firmament. The two former laid stress on the education of the child in his tender years. The latter carried the same principles to the boy in the grades. Many of you are extending this influence in the high schools and colleges. Tell us, therefore, what you are doing or propose to do to perfect the great work of vocational education, particularly as it is applied to Cabinet Making or Woodworking.

American Woodworking Machinery Co.

Educational Department — Rochester, N. Y.

Every eligible contestant will be rewarded for his effort with an elegant fountain pen valued at $6.00, and a series of cash prizes aggregating $10.000.00 is offered for the best essays.

For your information, we have prepared a folder giving complete details of the contest which we will send you immediately if you write for it.

INDUSTRIAL-ARTS MAGAZINE

Volume XII AUGUST, 1923 No. 8

Standards for Judging Demonstrations

Prof. D. J. MacDonald, Ohio State University.

THE question as to what constitutes a good demonstration has long been a favorite topic for discussion, as indeed it should be. For the demonstration method, as such, will always remain the most satisfactory, even if the most popular method of teaching. In fact, if all of the possible teaching opportunities or jobs inherent in the life, of the average community of ten thousand persons for one week, were cataloged, and expertly analyzed for the purpose of determining the best methods of teaching each of them, it is safe to say, that the demonstration method would be selected in the vast majority of cases. Obviously this is merely equivalent to saying that the demonstration method is the most natural method of teaching and that it corresponds more closely than any other to the conditions under which learning takes place most rapidly and effectively. In view of this it is strange, indeed, that so little, relatively speaking, has been written regarding the demonstration method of teaching as such.[1] Surely its importance, particularly in the field of shop subjects, justifies its being singled out for special consideration.

It is unnecessary to remind the reader that one might easily answer the question as to what constitutes a good demonstration by saying, more or less arbitrarily, that a demonstration is good if it succeeds in teaching some one how to perform any given activity, or series of activities, in such a way as to secure desired results. But, strictly speaking, such as answer is so inadequate that for practical purposes it is valueless. Something more specific, more exact in character, must be provided before the teacher can place a measuring stick up beside his work and criticise it justly and intelligently. It is to provide, if possible, this needed means of measuring his work that I have endeavored to make a thorough analysis of the demonstration as it appears in ordinary school shops. If it should happen, as I hope it may, that the criteria for passing judgment which are set forth therein prove useful as well in connection with the teaching of other subjects, well and good; but this, let it be understood, is not the immediate objective.

[1]Among the best recent discussions of this method is that by Mr. S. J. Vaughn in the December, 1919, number of this magazine.

Some Basic Principles.

Since such criteria as shall be suggested will be based upon the psychological principles either directly or indirectly involved when one teaches by demonstration, it will be advisable to examine at least the most important of these. This may be done to advantage if we, first of all, make an analysis of the average demonstration and find out what is involved mentally and physically on the learner's part when this method of teaching is employed. To avoid possible misunderstanding as to the scope of the average demonstration, let us agree that it shall consist of a performance of the movements necessary to the completion of the job or project to be performed, together with such explanatory remarks as are considered essential for making the work entirely comprehensive to the pupils.

We may conveniently approach our problem through the question, when is a demonstration well given? And we may, for present purposes at least, answer the question by saying that a demonstration is satisfactory when the learner knows not only the various movements or steps which must be performed in order to complete the job satisfactorily, but the order in which these movements must be performed, and enough regarding the nature of the various steps to enable him to start to perform them. As to knowing the exact way in which to perform, even if perfectly, all of the various movements involved, this is too much to expect of any learner and is, therefore, too high a standard to set up for any demonstration.

Our task, then, is to find out what mental and physical powers and capabilities are primarily involved when a learner meets the requirements enumerated. That is to say, when he knows (1) the various movements he must perform or the steps he must take when he attempts to do the job or task, (2) when he is at least aware of how to start to perform the various operations, and (3) when he knows the exact sequence in which the various operations are to be performed. Putting the same thought into more specific terms, we must ascertain whether the demand when the demonstration method is used is chiefly upon the learner's observational

powers, his memory powers, his comprehending ability, his imagination, his ability to coordinate eye and hand, etc., or upon a certain varying combination of these with the emphasis upon one or two. Following this we must ascertain the true relation of each of these important learning factors to all others and seek to advise a method which accords in detail therewith. The questions which follow call attention to the important features of demonstration, and, therefore, may well be used as a basis for discussion:[2]

1. When should a demonstration be given in order that the learner may derive the greatest possible good therefrom?
   (a) Should it precede any attempt on the part of the learner to do the act or perform the operation, as for example in the case of (1) driving a nail, (2) swimming, (3) walking on stilts, (4) riding a bicycle, (5) making a box, (6) driving an automobile, (7) cutting centers, (8) sharpening a tool, etc., or
   (b) Should it follow initial efforts on the learner's part to do the act successfully or to perform the operation more or less satisfactorily?
2. What bearing, if any, on methods of demonstrating should the fact have that when we come in contact with an object or an act for the first time we see it as a whole rather than give attention to the parts of which the whole is made?
3. (a) How long a demonstration may safely be given?
   (b) What should determine the length?
4. In case experience proves that a demonstration is too long to be practicable for teaching purposes, what alternatives may with propriety be resorted to?
5. Under what conditions, if at all, is the teacher justified in placing before the learner a written sequence of the operations involved in the successful performance of the work?
6. What part, if any, does the factor of speed play in making a demonstration effective or ineffective?
7. In case comment of any kind accompanies the demonstration
   (a) what should its distinguishing features be;
   (b) why should it be of the nature suggested rather than otherwise?
8. Other things being equal, what effect does the degree of skill manifested by the demonstrator have upon the quality of results?
9. What difference, if any, does the demonstrator's position as to the work and the learner, respectively, have to do with the effectiveness of the demonstration?
   (a) Should he face the learner as he works?
   (b) Should he stand to the left of his work?
   (c) Should he stand to the right of his work?
10. To what extent, if at all, should the demonstrator call attention to construction principles or guide posts, as for example,
    When making a pattern always bear in mind that it must be in such condition when finished that it may be taken from the mould without disturbing the sand with which it comes in contact.

Since the analysis of a relatively simple demonstration will serve our purpose as well or better, at present, than would an analysis of something more difficult in character, let us try to find out what is involved in teaching how to handle an ordinary cross cut saw.

1. Aim or object: To teach the learner to handle the saw so that satisfactory results are secured quickly and easily.
2. Essential ideas or facts to be gotten across:
   (a) Piece of wood should be firmly anchored;
   (b) Saw is to be held at proper angle to insure ease in operation;
   (c) Handle of saw is to be gripped firmly but not too firmly;
   (d) How to start saw properly;
   (e) Saw is to be drawn up and down with easy movement;
   (f) Pressure is to be put upon the saw only on the downward stroke.

On the assumption that all of the essentials have been singled out in the foregoing analysis, we are now prepared to find out what mental and physical powers of the learner must be called into service in order that the purposes of a demonstration, as above enumerated, may be realized. It should be recalled, however, at this time that, according to our leading psychologists, no ideas which involve activity are ever put over completely, since it is always essential that the leaner shall go through the arduous labor of learning; that, in other words, the only gate through which learners in the manual field may pass with credit is that of "trial and error." As some one has well said, "It seems to be possible to go much farther in transferring knowledge than in transferring skill.

It is not difficult to see.

1. That observation and memory will be needed in every case;

2. That ability to comprehend any and all explanatory remarks will also be prominent;

3. That good judgment will be required in order to interpret correctly the remarks of the instructor and to evaluate properly the various movements; (This would involve all past experiences in both mental and physical fields.)

4. That imaginative ability also enters in.

If our analysis is correct there is but one thing to do, namely, to become thoroughly informed on the psychology of each of the above mentioned abilities. For how can one teach properly unless he knows how much and how well he should expect his pupils to remember, unless he fully understands the conditions under which learners observe best?

When Should the Demonstration Be Given?

In the article above referred to Professor Vaughn disposes of the question as to when a demonstration should be given in the following way: "The demonstration should be so timed as to meet the immediate needs of the class with the work in hand."

It will be noted that the question, as I have stated it, has something quite different in mind. No one, I believe, is likely to disagree with Professor Vaughn's answer so far as he goes. His weakness is that he doesn't go far enough. It is a universally recognized principle in education that persons—in fact, all organic bodies—learn best when the need is most pressing, or, in other words, when the desire of urge to know is strongest. What shop teachers are much concerned about—if I interpret their inquiries correctly—is how to get their pupils into the proper mood for instruction rather than merely that of "timing the instruction so as to meet their immediate needs." A contact extending over ten years with teachers of manual work has satisfied me that the great majority of teachers get

[2]These questions have proved very effective in connection with teacher-improvement classes.

along fairly well if their pupils really want to do the jobs they are asked to do; but that they are woefully at sea if it becomes necessary to bring their pupils to the point where they desire instruction. Possibly I can make this distinction clearer by referring to such common experiences as learning to ride a bicycle or to walk on stilts or to stand on one's head, etc. At what stage of the game is the average boy most eager to learn any one of the stunts: (a) before he has tried it at all; or (b) after he tried it with only partial success? Unquestionably the latter, all will agree. In other words, he is truly ready to be taught only when he has found out that he needs instruction.

It is fair to inquire as to whether the illustrations cited are representative of school shop conditions as we find them. Can we claim, in other words, that projects in school shop are comparable as to interest-invoking characteristics with the illustrations cited? Yes, and no. Yes, if we are not hidebound as to what should constitute a course of study. No, if we are adherents to traditional ways of getting the pupils to learn how to do things skillfully.

It is appropriate, also, to raise the question as to whether we are justified in applying this criterion rigidly to school shop conditions. The members of the group are by no means few who believe that earnest, wholehearted application to a worth-while task in which the learner is truly interested is of incomparably greater value to him in the long run than to work half-heartedly at some assigned task or exercise. That such a selection of subject matter is possible in manual subjects scores of isolated teachers have demonstrated over and over again. Such being the case it may be safely asserted that, at least for the majority of pupils, the common illustrations cited above, namely, those of riding a bicycle, walking on stilts, and standing on one's head are not at all inappropriate if the nature and purpose of school work are properly conceived.

I now raise the previous question as to when the learner is most ready to receive instruction—before he has tried to do any of these stunts, or after he has tried and failed or perhaps partially succeeded? And while I do not mean to imply that because a practice has prevailed for generations it is right, it is worth reminding ourselves in this connection that outside of school walls, especially in connection with the common everyday activities which do not involve undue risk, the method of teaching which is prevailingly employed is that which conforms closely to the one now being discussed. The learner sees someone do the thing one or more times, after which he tries his hand at it. If it is extremely easy or he is unusually apt, he gets it done passably well. But in no instance does he get on to the numerous tricks of the stunt for some time to come, in fact, frequently not at all, unless his attention is called to them early. Instance, in this connection, the very common task of shaving. I have made it a point during the past five years or more to ask hundreds of persons how they use a razor, only to find that, with few exceptions, they have never realized that in order to get the most service out of a razor it must be used in the same way as other knife-like instruments, i. e., with a forward-sidewise movement. These observations, which, by the way, are supported in part by scientific experiment,[3] justify the position that the demonstration as a teaching device is most effective when timed as follows, provided (1) the right kind of subject matter has been chosen, (2) that it is within the boundaries of the pupils' ability, (3) that the unit of activity is sufficiently small for effective demonstration.

1. Provide the learner with a general idea of the act or series of acts which enter into the performance of the piece of work or unit experience by performing the act or series of acts before him once or twice.

2. Give the pupil a chance to try his hand at the task or job at the earliest possible moment.

3. Stand ready to note the pupil's shortcomings; also, to offer assistance when he has reached the point where he feels the need for additional instruction.

4. Though the first demonstration was, or should have been, practically free from comment, later demonstrations may well be accompanied by pertinent yet *limited* explanatory remarks for the reason that the pupil now has a background of experiences which will enable him to assimilate, in part, the remarks offered.

The testimony of one of my students is apropos at this point. He took it upon himself to question his pupils and ascertain, if possible, how they felt regarding the different methods employed by teachers in giving demonstrations. His report shows that six out of seven favor a procedure similar to that above indicated. While no one would claim that such information is necessarily reliable, it cannot be denied that many carefully conducted investigations of this character would provide substantial evidence. It is my firm belief that such evidence would confirm that cited above.

Of sufficient significance to warrant special mention in this connection is the fact that when one sees an object or an act for the first time he does not see the details. On the contrary, he is interested in the object or act as a whole and as a consequence thereof is satisfied merely to get a general idea about it. Attention to details is a matter of later development. In other words the learner is interested first in the tool, machine, operation or act as a whole. Until his curiosity has been satisfied in this particular, time and energy spent in attempting to get him to give his attention to details are unwisely spent. It seems to be a plain case of letting him creep before expecting him to walk.

If my interpretation of this is correct then we merely

[3]Judd, Psychology of High School Subjects, P. 269.

have additional support for the position taken that brief demonstrations should be followed by a period of experimentation on the learner's part, after which attention may wisely be given to less obvious phases of the operation, or series of operations, that constitute the entire unit of work.

(To be Concluded)

Art Craft Work in Pyroxylin

Frank O. Kreager, Springfield, Mass.

Pyroxylin is a modern wonder in common everyday use, yet little known. It passes for ivory, jade, tortoise shell, jet, and amber, but its base ingredient is tissue paper treated with nitric and sulphuric acids. Camphor, alcohol, and coloring matter enter in later processes. Pyroxylin is nitrated cellulose, or in other words, "celluloid," and is closely related to gun cotton, but is of lower nitration and consequently is not explosive but is inflammable. Artificial silk is also a form of nitrated cellulose. The uses of pyroxylin are innumerable and rapidly increasing; umbrella handles, eye-glass rims, combs, baby rattles, picture frames, fountain pens, buttons, typewriter and piano keys, automobile sun-shields and "flexible glass," knife and razor handles. "French Ivory," and "Florentine" jewelry—after all are only pyroxylin. Just now it is extremely popular in the form of belt and girdle buckles, ear drops, bracelets, necklaces, and pendants.

Pyroxylin is an admirable art-craft material as it can be cut, sawed, drilled, carved, bent, cemented, and polished. It has all the advantages of wood or ivory as a carving material, and many more. The wide range of colors in which it is made make possible unusually fascinating work in applied design.

This material is manufactured in sheets, usually 20″x50″ in size, and in varying thicknesses ranging from 1/100″ to an inch or more. These sheets are measured by gauges of thousandths of an inch—ten gauge being 10/1000. It is also made in rod form of varying sizes, depending upon the purpose for which it is to be used—hairpins, fountain pens, dice, or umbrella handles. It is made under a number of trade names, such as fiberloid, pyralin, viscoloid, and ivoride.

Experience with this material as a craft project for "achievement clubs" proves that it is especially suitable for both boys and girls of upper grade and high school age, for craft workers seeking a new and excellent form of expression, and for beginners in craft work. Leaders and members of "achievement clubs" have made a very wide range of useful and beautiful articles, including girdles, buckles, pendants, fobs, hat ornaments, cuff links, bracelets, stick pins, jewel cases, lamp and shade pulls, brooches, combs, and blotter sets. These articles are in demand for Christmas presents and the gift shop trade. One "achievement club" is sending its products to an American gift shop in China. Tutankhamen jewelry, that, for gorgeous coloring, would gratify the ancient king himself, is readily done by a good craftsman. As school work, it should fit into the manual arts or art-crafts program as an advanced hand-craft project, and should give excellent preliminary training to courses in art-metal work and jewelry. It combines many of the advantages of wood and metal, and also allows the use of color to an extent and in ways not possible in either. It is equally fascinating to boys and girls and to grown-ups.

Process and Tools.

The tool outfit needed for successful work is not elaborate or expensive, while the technic may be readily learned. The following are the main processes and the tools necessary:

Cutting. The thin sheets of 40 gauge or less can be cut readily with a pair of heavy shears—dental snips, costing about a dollar, are excellent for this purpose. Heavy scissors will do.

Sawing. Sawing can be done with either a coping saw or a jeweler's saw. A coping saw works very well in the heavy material, but the jeweler's saw will do finer, smoother work. A sawing board (Fig. 1.) about 3″ by 12″ or 15″, and a half an inch thick, with a hole an inch and a half from the end and a V-shaped space between the hole and the end is about the best device upon which to rest the work while sawing. The board is clamped to a desk or table, and the saw blade is kept in the hole or V. The thinner the sheet of pyroxylin the finer the saw that can be used; the very fine saws do not work well in heavy material. No. 2 metal saws are about right for most purposes.

FIG. 1. SAWING BOARD CLAMPED IN POSITION ON TABLE.

Drilling. A hand drill with twist drill bits ranging in size of from 1/32″ to 6/32″ is admirable for the purpose. Twist drills are much superior to fluted drills for this work. Clamp the pyroxylin to the sawing board with a small clamp. Use little pressure on the drill but hold steadily. An awl with a broad point is a fair substitute (Fig. 2.).

Bending. Both rod and sheet material bend readily when heated. Heating can be done either by immersing for a short time in boiling water or by the use of a hot plate and dry heat. An electric iron covered with a thin sheet of asbestos is satisfactory. Some of our club members have done successful work by put-

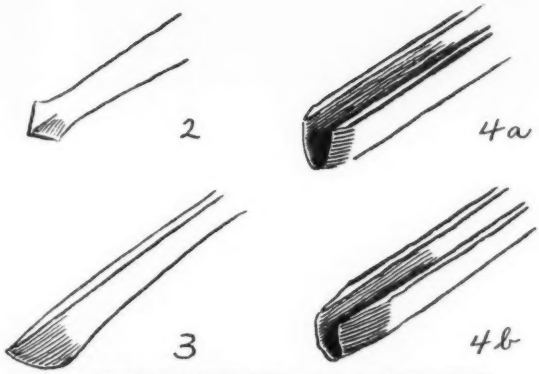


FIG. 2. BROAD POINTED AWL. FIG. 3. SKEW CHISEL.
FIG. 4A. U TOOL GROUND FOR WOOD CARVING.
FIG. 4B. U TOOL GROUND FOR PYROXYLIN.

ting the material in a warm oven. *It must be kept away from an open fire of any kind as it is inflammable.*

Carving. Both small wood carving tools and metal gravers may be used for carving and engraving. A V-tool is made especialy for this material and is used by engravers who do monogram work on such articles as mirror backs. Wood carving tools must be ground with a much longer bevel than for working in wood. The most useful carving tools for the beginner are a small skew chisel (Fig. 3.) and a U-tool (Fig. 4a and 4b.)—those of the No. 1 Millers-Falls set are very satisfactory. Warming the material softens it and makes carving easier. Cement has a similar effect.

Cementing. Pyroxylin hardens with age. Pyroxylin is cemented not by the use of glues, but by solvents, which partially dissolve the material and allow fusion to take place. A very good cement can be made from amyl acetate and denatured alcohol—about half and half. The more acetate used, the more powerful the cement will be, but the more rapidly it will be absorbed by the material. Thick cement can be made by dissolving some pyroxylin in amyl acetate. Each worker can experiment until he finds the cement that he can use best. A camel's hair brush is used for applying the cement. End-to-end rod cementing is done by dipping the ends, then holding together for a short time. Sheet cementing is done by spreading the thin cement *rapidly* with the brush over one piece until a smooth liquid surface is formed and then putting the other piece *quickly* into place in such a way that no air bubbles are enclosed. The rapidity with which the cement is absorbed by the pyroxylin makes it inadvisable to try cementing large sheets.

Polishing. Pyroxylin may be polished in a number of ways. Fine sandpaper, 000 or 0000, and the finer polishing powders, finished off with a woolen cloth slightly oiled give excellent results. Buffing may be used to good advantage. Polishing is done in factories by means of an acid dip. Amyl acetate gives fair results. Acetic acid is a good polish but is disagreeable to use and burns and blisters the skin. Its use is not recommended. The acid dip polishing used in factories does not compare in rich artistic effect with the hand rubbing processes.

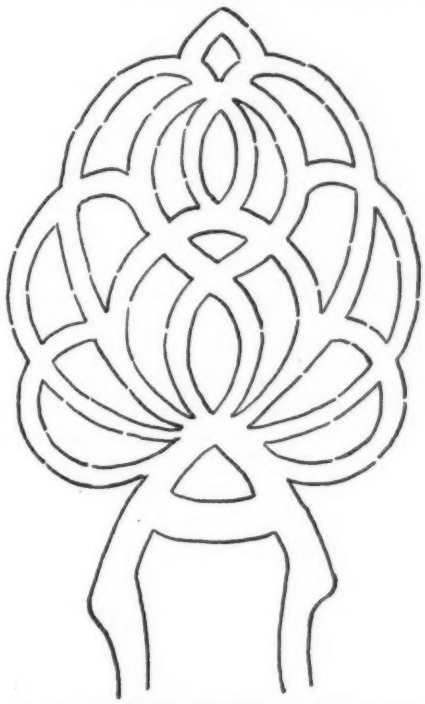


FIG. 7. COMB DESIGN—PIERCED OR SAWED OUT—WITH SLIGHT CHANGES MAY BE USED FOR PENDANT OR FOB.

FIG. 5.
SIMPLE DESIGN.

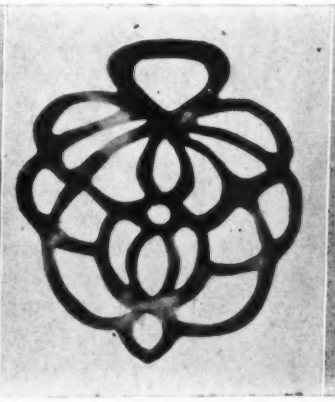


FIG. 6.
SIMPLE PIERCED DESIGN.

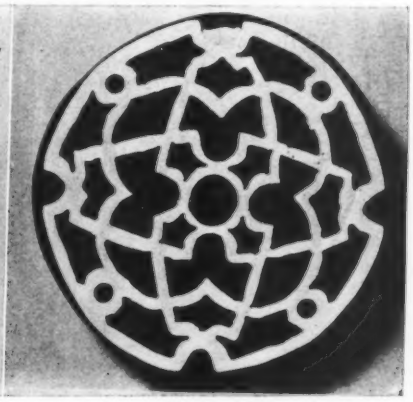


FIG. 8. PIERCED DESIGN CEMENTED TO BACKGROUND.

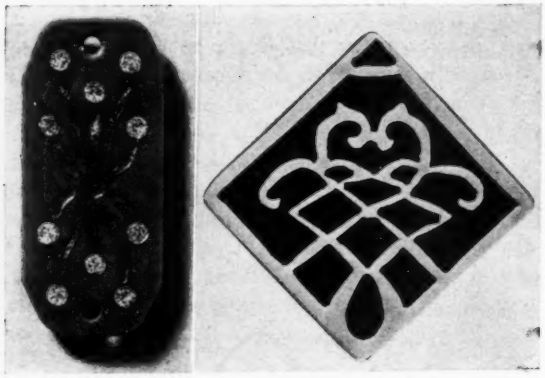


FIG. 10. FIG. 9. PIERCED DESIGN MOUNTED ON BACKGROUND.

Beginning Work.

The beginner should choose for his first piece some simple article, such as a pendant or fob which will depend for its attractiveness upon good proportions, and the beauty of the material (Fig. 5.). Elaborate design will not make up for poor proportions. The following are the steps in making such a pendant or fob:

1. *Selection of material.* Pearl, amber, ivory or shell pyroxylin give satisfying first results. If shears are used, a thickness not over 30 gauge should be selected. For sawing use 75 or 80 gauge.

2. *Making the design and transferring it to the material.* Select, draw, or cut from paper some simple pleasing shape—an Indian arrowhead is good, and transfer the pattern to the material. On light colored material this may be done by means of carbon paper or by direct sketching. Paste the design on dark colored material and cut or scratch the lines with an awl or a fine, sharp-pointed knife.

FIG. 11. CHILD'S PENDANT.
Sawed out (pierced) and carved pattern—then overlaid on harmonizing colors. Ivory on black, yellow on green or pale blue.

3. *Sawing.* The material should be held firmly on the sawing board, with one finger just behind the saw blade and with the saw blade as close to an edge of the board as possible. The material has a certain amount of spring in it, and it does not saw well if there is much space between the saw and the point of rest. The saw should be moved with a straight up-and-down motion and should never be crowded. In turning corners, much up-and-down motion and little turning is needed.

4. *Trimming the edges.* This may be done with a block plane (on straight edges), a skew chisel, a file, or sand paper. The beginner will find the sand paper most convenient. A sharp pocket knife is excellent. Drill a hole for cord or ribbon, and the pendant or fob is finished.

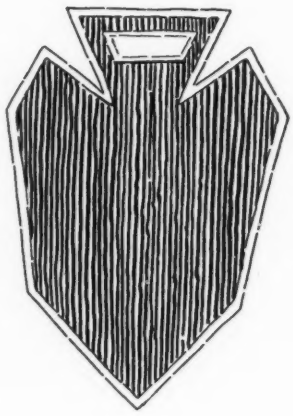


FIG. 12. PENDANT STRAIGHT LINE SCISSORS CUT BEVELED EDGES.

FIG. 13.
LITTLE SLUMGULLION.
The chameleon changes, but as any college student will testify, Slumgullion changeth not. Two piece work, mottled green on shell, cemented or riveted.

The Second Step.

After the beginner has successfully sawed out and finished a simple pendant of good design, one requiring decorations may be undertaken. The easiest kind of decoration is done by drilling holes (Fig. 6.), partly or entirely through the material. Conventional floral designs can be very effectively worked out with nothing more than a drill.

Next, a pendant, fob, or comb may be made with a pierced or sawed-out pattern (Fig. 7.). The pattern is carefully drawn or scratched on the material, a hole is bored in each section to be sawed out, the saw blade is inserted and the sawing done in the usual way. Small files—round, triangular, half-round, and flat, are useful in smoothing up some of the places where the saw didn't just go where it should.

This sawed-out design may be further enriched by cementing to a harmonious background of another color (Figs. 8 and 9.).

After this process has been mastered, carving with a U-tool may be undertaken.

All beginners should be careful never to have the tool in such position that a slip would result in a cut hand. The material to be carved may be either clamped on the sawing board, or placed against a step on the board. An oil-cloth covered table or board is excellent for this work, as the oil-cloth causes enough suction to prevent the material from slipping under ordinary carving pressure. The beginner should learn as soon as possible the angle at which the tool cuts best and the best cutting speed. Raising the handle too high causes the tool to dig in too deeply, while holding the handle too low causes the tool to slip and mar the work, and sometimes cut a finger. Crowding the tool beyond its cutting speed will also cause it to slip. The angle and speed at which a tool cuts best in a given material can soon be learned. A very effective design may be worked out by combining the carving and the drill work. Color and richness may be given carved and drilled work by filling with wax used for that purpose (Fig. 10.). Ordinary school wax crayons can be used with good results. Simply rub and press the wax into the incisions until they are filled, and then wipe and brush carefully.

Over-laying and under-laying. After a fair amount of proficiency in carving is attained the next step to test the skill of the craftsman is over-laying and under-laying. This process involves the use of two or more sheets of material cemented together. An overlaid and carved pendant (Fig. 11.) is made in the following way:

Cut the material into pieces of about the same size, but a little larger than the pendant. Use heavy material, about 75 gauge, for the base piece and light, 10 to 20 gauge, for the overlays. Lay the base piece flat on the table. Place the overlay in such position that it can be reached quickly. Brush on the cement, applying it with as few strokes as possible in such a way as to leave a smooth, liquid surface. Drop the brush and quickly take up the piece of overlay. Put one end in place and press from this end to the other in such a way as to crowd out all air from between the pieces.

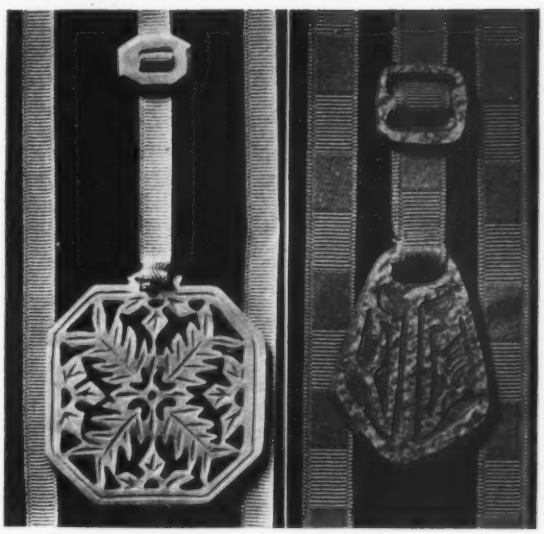


FIG. 16. PENDANTS.

The second piece may be again overlaid, and so on, until as many pieces as are desired are cemented together. If the pendant is to be double-faced, the reverse side should be treated in the same way. The blank should be allowed to stand at least two hours under a smooth surfaced weight, a flat-iron is good, before any carving or other work is done on it. By using two or three overlays, a number of color combinations can be brought out by the depth of the carving. Color designs having character all their own can be worked out in this way in three or more combinations as satisfactorily as with paints. After carving, the pendant is sawed out from the blank and the edges trimmed and usually bevelled. If after a time the overlaid work warps or twists, it may be straightened by heating.

Jewel box construction, stone setting in brooches, pendants, stick pins and fobs, attaching pins and pin stems, wire work in connection with buckles and girdles, bead making and rod floral work will be explained in later articles.

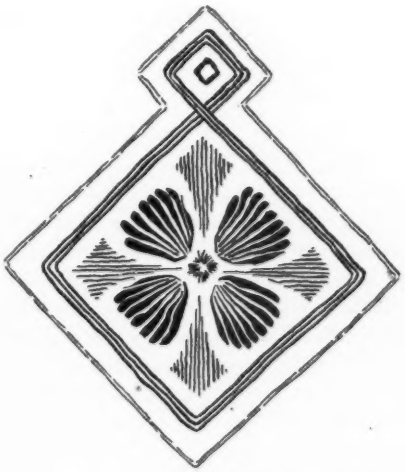


FIG. 14.

FIG. 15.

OVERLAID AND CARVED PENDANTS OR FOBS.

Antique Finishes

Gardner G. Willard

FASHIONS in furniture at present lean very strongly toward the antique finishes. This is probably due to three reasons; the demand of the general public for something new, the demand of the furniture manufacturer for a finish cheap and easy to produce, and the desire of both for something really beautiful and artistic.

That these demands have been met successfully is evidenced by the furniture now on display in any progressive dealer's store. We find numerous examples of these new and artistic finishes. They are, of course, known under a variety of names, according to the taste of the manufacturer or dealer. Among these may be mentioned antique walnut, Italian walnut, dusty walnut, Italian oak, and antique oak. Polychrome might also be included, although this finish is not within the scope of this article, and is more of a decoration than a finish, strictly speaking.

The names listed above will serve to give the reader a general idea of the appearance of these finishes, if he has not yet had the opportunity of seeing them. They are all more or less similar, having dusty pores, and with brown, walnut or gray backgrounds. The gray is oftimes shaded into a variety of tones, some being a pure gray, while others are of greenish or bluish shades. The general effect of a piece of furniture, with a soft brown or gray showing through dusty pores, is very beautiful indeed, and must be seen to be appreciated.

Rosettes, mouldings, etc., are usually used, and these are "antiqued" the same as the body of the piece, in order to blend harmoniously with the whole.

I have found that many manual training instructors, especially in the high schools, are always on the alert for something new to introduce into their work, and I believe that they would find it highly profitable to finish at least a few pieces according to the methods suggested in this paper.

I have had the pleasure of showing these new finishes to a number of instructors, and they have expressed great interest in them, and have wondered, of course, if it would be practicable to introduce these finishes into their school work. On this point there can be no doubt, for antique finishes are very simple and perfectly suitable for schools. The finishes are made with lacquer and wax, and everyone is able to handle such a simple thing as this. Prior to the lacquer, of course, the wood is stained and semi-filled.

As stated above, these finishes are applied to a variety of woods. Possibly the most popular has been walnut, antique walnut and Italian walnut being visible at every point. Antique walnut is generally denoted the brown shade, and Italian walnut the gray shade. There is no set rule, however, and some makers have these names exactly reversed. At present oak is being finished in only one shade, brown, and this is known as Italian Rennaisance oak, generally shortened, for convenience, to simply Italian oak. Oak is coming rapidly into favor, and manufacturers who have not used oak for years, are now turning to this sturdy wood. Mahogany has also been used, though to a slight extent only, the finish usually being on the reddish-brown.

Some have censured these dusty-pore finishes, but it would seem they must have real merit, for we find the finest designers in the country are bending their efforts toward these finishes coupled with new designs, and the makers of high grade furniture are turning out some remarkable creations.

As I have said, the ease and speed of producing these finishes make them very desirable for schools, and enable any home to have at least a few pieces finished in these modern shades. Oak is, of course; more largely used than walnut or mahogany in schools and therefore I shall give a detailed description of the finish as applied to oak, and general directions for the other woods.

When using oak, any variety will produce pleasing results. Oak having large quartered flakes is not so good as that having smaller ones. Plain oak is fully as beautiful as quartered, and often I think even better. The best wood seems to be that having a deep narrow pore, as it gives a little better effect than that having long, shallow ones. Such wood is usually obtainable, and can be selected for table tops and fronts of desks.

In finishing a piece, the first thing to do is to get the wood perfectly smooth with fine sandpaper. Factories are now laying a great deal of stress on this point, and insist that all pieces shall be perfectiy sanded, as it means economy in the long run, and a much better finish. If you want an extra fine job, first sponge the wood with clear water, and after it has dried, sand carefully with fine paper. The piece is then ready for staining.

A suitable stain for Italian oak finish is as follows:

ITALIAN OAK STAIN FORMULA:

Jet Black Nigrosine	2	ozs.
Blue Black Nigrosine	3½	ozs.
Acid Orange	4½	ozs.
Scarlet 2RB	1	dram
Water	1	gallon

This formula makes one gallon of stain, but lesser amounts can, of course, be easily prepared by simply reducing the formula. The best way to mix this stain it to put all the powders, carefully weighed out, in a glass or earthen dish. Add a little hot water, and stir to a smooth paste. Now add gradually the remainder of the water, stirring all the time, until the colors are perfectly dissolved. In this way a perfect solution is obtained, none of the powder wasted, and no trouble is had with the stain powder sticking to the sides of the dish, or floating on the surface of the water. As a precau-

tionary measure against streaks or spots on the work, the stain may be strained through a cloth but for ordinary work this is unnecessary, if proper care is taken in dissolving the powders. In making the solution hot water may be used, and is preferable. It is not necessary to boil the stain, as some do.

The stain is now ready for application. A fairly wide, soft brush is best, depending on the size of the piece to be stained. All end wood should first be given a coat of clear water, so that these parts will not show too dark. Flow the stain on freely so that the wood can soak up as much as possible. After a few minutes, wipe the brush fairly dry on the edge of the staining cup, and lay the stain off. Do not lay it off too thin but endeavor to have a uniform coating over the entire piece. Some stainers prefer to lay the stain on a little thinner, and give the work two coats, the second after the first is dry. Now let the piece stand until perfectly dry, and then sandpaper carefully with four-0 sandpaper, when the piece is ready for filling.

The filling is designed to give the pores of the wood the desired dusty-gray appearance, and is prepared by mixing powdered rotten stone with turpentine, or naphtha, into a thin paste. A little Japan drier may be added as a binder. This paste is then applied with a rag or brush to the work, and thoroughly worked into the pores, going *with* the grain of the wood. As soon as the filler begins to set, it should be cleaned off with a clean cloth. Do not use cotton waste, as the threads and fuzz will cling to the wood, and be difficult to remove, making a clean job impossible. Clean off the filler well, rubbing *across* the grain. Remember that we only want the filler in the pores, any that remains on the wood will give a cloudy or muddy appearance. If the filler does not clean off perfectly, barely moisten a clean cloth with a little naphtha, and rub the work vigorously. The reader will understand that the filler is not designed to fill the pores of the oak as a silex filler does, but merely to color them to a dusty appearance. A few hours will suffice for the filler to dry, as in this case we have no linseed oil, which must slowly oxidize in order to dry.

Next comes the coat of wood-lacquer. Be sure to use genuine *wood-lacquer* and not the old metal lacquer coaters of the past. The modern wood-lacquer is blended with special gums, and forms an ideal coating for wood, as it is very tough, dries quickly, requires no sanding between coats, and is waterproof. Also it is not subject to checking or crazing.

The ideal way to apply the wood-lacquer is by means of the spray, or air-brush. For most schools this equipment is not available, and brushing may then be used instead. For small work a fixatif sprayer, such as is used for spraying charcoal drawings will answer, and good results may be obtained with a little practice. For spraying in this way, the lacquer should be reduced with an equal amount of the special wood-lacquer thinner It is necessary to use this special thinner because ordinary solvents will not mix with the wood-lacquer, and it is also very heavy-bodied, almost like honey.

For brushing, reduce the lacquer about 60 to 75 per cent, and use a wide, soft brush, so that the wood-lacquer can be flowed onto the wood. Brush it as little as possible, endeavor to flow it on so that the wood has a full wet appearance. When reduced fifty per cent one coat is sufficient for a wax finish but when reduced more than this, it is advisable to use two coats. The second may be applied shortly after the first is dry. It is not necessary to sand between the coats, unless an exceptionally smooth job is wanted, when very fine paper should be used.

When the last coat of wood-lacquer is perfectly hard, sand the whole piece very carefully; it is then ready to wax and polish. Any of the prepared paste or liquid waxes may be used, or the instructor may prepare his own after the following formula:

Pure bees-wax ..... **4 lbs.**
Turpentine ..... **1 gal.**

Melt the wax over a low fire, and then add the turpentine, stirring thoroughly. The wax is applied in the usual manner, and rubbed up to a good polish. A little better effect is secured by spreading on the wax, dusting with rotten stone, wiping off the excess, and then polishing. Sometimes a little rotten stone is rubbed in after the work is polished. The best method for each instructor will be easily ascertained after a few trials.

Decorations and fancy mouldings add greatly to the appearance of any piece, and in general are to be treated the same as the rest of the work. In waxing, however, a liquid wax is the best to use, and some rotten stone should be added to it, and thoroughly stirred up. In this way the rotten stone will be carried into all the depressions of the ornament, and when dry will give the desired dusty effect. Be careful not to have too heavy an accumulation in the hollows, leaving just enough to give a suggestion of dust and age.

This completes the finish for Italian oak. While it may, at first, seem rather lengthy, yet it is very easy to produce, and by forcing the drying, may be turned out in a very short period of time. It is a handsome finish that will outwear shellac or varnish, and one that is finding much favor with the instructor who wishes to keep abreast of the times.

For walnut and mahogany the general procedure is exactly the same as for Italian oak, with the following exceptions and stain formulae:

Formula for Italian walnut (gray shade).
Greenish Nigrosine ..... **2 oz.**
Water ..... **1 gal.**

Formula for Italian walnut (blue shade).
Blue black Nigrosine ..... **2 oz.**
Acid Blue ..... **10 grains**
Water ..... **1 gal.**

Formula for antique walnut (brown shade).
Loutre R ..... **2 ozs.**
Indian Yellow H ..... **1 oz.**
Bichromate Potash ..... **½ oz.**
Water ..... **1 gal.**

Formula for antique walnut (walnut shade).
Nigrosin Jet Black ..... **1 oz.**

Indian Yellow H	1 oz.
Acid orange DX	½ oz.
Bichromate Potash	½ oz.
Water	1 gal.

Formula for mahogany (reddish-brown).

Mahogany Red No. 1000	4 oz.
Mahogany Brown No. 1001	4 oz.
Bichromate Potash	1 oz.
Water	1 gal.

The above stains are prepared exactly the same as the Italian oak. The mahogany stain is applied rather heavy so as to give a deep shade but it will be seen that the walnut stains carry much less color to the gallon, and produce much lighter tones. Instead of the rotten stone filler, white lead or zinc may be substituted so as to give a white pore. Zinc is preferable because it is whiter, and does not have the poisonous effects of lead. By varying the tone of the filler, many novel and original effects may be obtained which are very beautiful. The balance of the finishing process is identical with that just given for Italian oak.

The Problem of Decorated Textile

Jean Paul Slusser, Wheaton, Illinois.

THE rapid and widespread development of batik in this country together with some recent happy experimentation with wool embroidery, and the successful utilization of both processes for purposes of wall decoration, have made it evident that there is a place in modern life for hand-made decorative textiles. One blushes at the necessity for the use in this connection of the word hand-made, since all decorative textiles were in happier days of the world's art of necessity handmade, like everything else, and no false or exaggerated meaning attached to the word. In those days walls were hung with tapestries and stuffs, both for the sake of ornament and to keep out the dampness and chill. Pictures had not become divorced from their connection with architecture, and were used as altar pieces or as decorations for certain specific places. With the increasing popularity of the movable or "easel" picture and with the decline of the handicrafts which accompanied the rise of industrialism and the introduction of machinery, pictures came to be the commonly accepted form of wall decoration. Gradually they came to be practically the only form of "hand-made" decoration available.

ENGLISH PETIT-POINT EMBROIDERY OF THE EARLY 17TH CENTURY.
Notice the charmingly decorative effect obtained through the repetition of spots, in particular those made by the sheep.

18TH CENTURY ENGLISH SAMPLER.
The type of design is thoroughly expressive of the medium. The surface remains flat through all over spotting.

A few modern craftsmen had already begun to cast about for ways and means of supplanting the stereotyped and the machine-made in wall decoration when the introduction of batik gave them a medium adapted to their experimentation, and indicated the possibility for the uses of modern decoration of some other object beside the inevitable picture. Indeed it appears that as regards movability, apparently a requisite, in this age of frequent moving about, of modern decorations, the decorative hanging has many points of superiority over the framed picture. Its possessor could at least in time of change fold it up as the Arab his tent, and silently steal away.

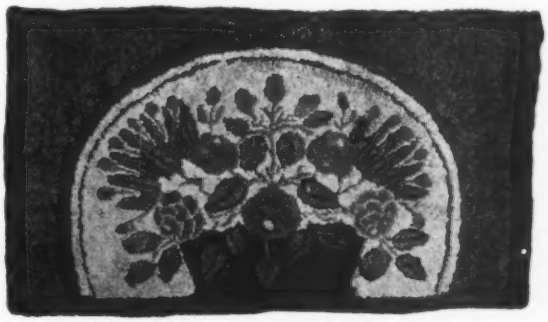
But the worker in decorative textiles, like the worker in various other forms of the industrial arts nowadays, is handicapped. For one thing, he finds no living tradition of textile decoration ready to his uses. So far are we from any living tradition in the industrial arts in this country that most of us can only conceive the nature of such a thing through experience with such craftsmen as the American Indians and their basketry, blanket weaving and pottery, or with the peasants of various European countries and their beautiful handi-

FLEMISH GOTHIC NEEDLEWORK TAPESTRY BORDER OF THE 16TH CENTURY.
Decorative effect obtained through symmetrical arrangement of parts, repetition of spots, and the division of the surface into small pari-colored areas.
Courtesy of the American Art Association.

crafts. There still survives in our own country, to be sure, a sound and artistic living tradition in the craft of designing and making patchwork quilts, and in some places in the making of hooked rugs. No housewife ever needs a textbook, or a course in design, to teach her how to plan and make a patchwork quilt. The art of embroidery, on the other hand, always one of the most important in the field of textile decoration, survives only in a feeble tradition, debased by the influence of machine-made realism and by the generally bad example of the arts in an age which considered a glib representationalism to be the goal of painting, if not of the allied arts as well. Such still seems to be the popular conception of the matter, although the extreme modernists in painting and in sculpture are taking desperate measures to demolish it. Illustration still labors under the curse of utter realism, and the moving pictures have scarcely begun to dream of anything beyond the sickly sweetish realism which they have spent so much money and effort to achieve. It is in fact in so far as concerns the popular tradition of art, the age of magazine cover realism.

In whichever direction one turns he finds the same vicious over-emphasis upon the pictorial and representative, the same lack of appreciation for real design and work expressive of the nature of its material and process. Even if one be "trained in art" in a reputable art school it is still quite possible that he should conceive the aim of painting to be a somewhat sweetened and composed representation of the model, and that of design to be nothing more than a slightly rearranged rendering of natural forms. It was not without significance that some years ago during the epidemic of pyrography or "burnt-wood" design, we got on every hand card tables and handkerchief boxes decorated with Gibson girl heads or sprawled-out realistic poppies, and it is no doubt to be expected today that we shall get in batik a surfeit of realistic peacocks, butterflies and Oriental dancing girls.

The serious craft worker who wishes to try his hand at decorative textiles is forced in the absence of any sound living tradition, to fall back upon his own common-sense and ingenuity, and upon a study of good work of the past, to deduce if he can from the examples of the medium available some of the principles underlying their design and treatment. He will naturally turn to examples of embroidery and tapestry-weaving, though perhaps even the lowly hooked rug in its best estate may teach him something about space-filling and conventionalization. The humble sampler, prim little eighteenth century cousin to the great needlework of the Renaissance, and the product of a genuinely artistic though attentuated tradition, can show an adaptation of subject-matter to the uses of design, and a regard for material and process, which makes it no less worthy of



EARLY AMERICAN FLORAL HOOKED RUG.
A good example of conventionalization of natural forms in the interests of clearness of design and flatness of surface, as well as in obedience to the demands of the process and material.
Courtesy of the American Art Association.

his study. The petit and gros-point embroideries of sixteenth and seventeenth century France and England are utterly charming examples of the right subordination in an art like needlework of pictorial qualities to the qualities of sheer design. The great tapestries, and in particular those of earlier and Gothic design are exemplifications of the beauty that lies in complexity, of the impressiveness of great spaces decorated with arabesques made up of interrelated forms and lines and colors.

One soon learns in studying such examples of decorative textiles as these that the effectiveness of the design depends in no way upon either the interest of the subject or upon the lifelikeness of its representation, or upon any other of the qualities commonly thought of as pictorial. The subjects, while sufficiently pretentious, being often of a religious, historical or allegorical nature, probably mattered little to the artist or craftsman, except as they gave him a pretext for knitting together a fabric of entertaining spots of color in wool or silk, or thread of gold or silver, to form a soft and variegated covering for the back of a sofa or chair or to hang upon the bareness of a cold stone wall. Clumsiness of drawing, unreality of color, make no difference in the charm of the total effect, unless it is to add to it by the open avowal they make that this is all in the realm of design and in no way a matter of reality or its close imitation. Composition in the ordinary pictorial sense of the word is apparently non-essential. Pictorial composition means ordinarily the dominance of the parts by the whole—a principal interest, a climax, the suppression of detail. None of these things, it appears likely, is wanted in the design of our tapestry or needlework panel. What is wanted is quite the opposite—the absence of climax and principal interest, the equal importance of the many parts, and an exuberance of detail which would be totally irrelevant and out of place in a picture. The interest, instead of being concentrated in one or two shapes or forms, is dissipated into many. The composition is "all-overish." The main thing is the variegation of the surface, the breaking of it up into small patches of color harmoniously interrelated and interwoven throughout the design. The total effect is one of utter flatness, and incidentally one of great richness, both important qualities in a decorated textile.

A further lesson to be learned from these and other decorative examples is the importance of a design and manner of treatment suited to the material and to the process of manufacture. The designer of the hooked rug found it inadvisable, working in this somewhat clumsy medium, to break his color masses with many details. They had to be kept simple and clearly separated. The fineness of stitching in the sampler gave its maker the chance for more delicacy of treatment, even to the point of some intricacy in the lettering though the nature of the latter was dictated by the character of the web upon which the work was done. Both designers knew better than to attempt reality in their portrayal of a tree or a person or a house, or to try to represent a leaf or a flower except in simple silhouette. They were content to make their trees of the schematic sort a child draws, with say, three branches on either side of the trunk, with several leaves apiece, a convention practiced in one form or another since time immemorial by designers and weavers of all periods and places. The workers in cross-stitch embroidery, having a larger stitch, were able to fill in all parts of their design with color, but the influence of the square meshes of the net underneath is perceptible in all their designs.

Applying to the designing of batik hangings some of the principles one finds exemplified in these decorative textiles chosen from older periods, one finds it first of all advisable to choose a motif which, if pictorial in its nature, will lend itself readily to "all-overish" treatment, perhaps in which a great deal of intricate detail will be possible. The nature of the medium, even as it is handled by western artists, makes it easy, if not inevitable to lay in masses of detail, through the handling of the brush in small separate touches. Large areas of color are also easily possible, though they have to be flat, except for the variegated mottling given by the characteristic batik crackle. Forms must rely for their effect upon their silhouettes and upon their color and value contrast. Thus it is that the designer is forced to choose forms that carry clearly and well in the silhouette, and colors and color-values that strike the eye

DECORATIVE BATIK HANGING
BY HONKA KARASZ.

Repetition of spots carried so far that it becomes practically an all-over pattern. A very quiet and flat design in two colors. The freedom of handling is utterly in the spirit of batik.

sufficiently through their harmony or contrast. Some care is necessary to see that the design is effective as a pattern of light upon dark or dark upon light, or both by turns. As a certain looseness, unevenness and accidental quality is almost inseparable from the nature of the medium, it is best not to insist too strongly upon accuracy and rigidity of outline—qualities which in themselves tend to deny the nature of cloth, a soft material whose web pulls this way and that. All-over spotting of the surface with recurring colors and color-values, variety in the spot-forms and in the schemes of contrast—dark upon light and light upon dark—spaces crowded with detail giving way to areas of comparative emptiness, slightly irregular outlines, all these pertain to the nature of the medium and hold some of the secrets of effectiveness in the making of decorated textiles.

The Individual Project Made on the Group Method Plan

C. B. Hilliard, Ely, Minn.

WHEN school began in the fall of 1921 the writer found that there were two problems which he must solve: First, three boys sought admission to woodwork and drawing classes to every two it had been possible to accommodate under the old system he had been teaching; second, boys who had taken manual training under his supervision the previous year did not understand the machines they had worked with and were inefficient and careless in turning out work. They took three months to make a pedestal that should have been finished in as many weeks. They could not glue, assemble, or square-up their projects accurately, although the processes had been thoroughly explained to them.

Had the teaching been so ineffectual? Had the boys been instructed or had they merely been witnesses of a demonstration? Apparently the boys had not been getting the benefits claimed for manual training. Some methods that would secure better results had to be worked out. A framed chart on the wall would look efficient, but it wouldn't find room for the extra pupils.

Our shop had been organized on the individual project basis. But a teacher is human. He cannot with his left hand show one pupil how to put a cabinet together, while with his right he is aiding another boy in the construction of a plant stand, and at the same time tell a third how to run the circular saw and listen to still another who wants advice on making a desk. If a teacher could do all these things at once, he would find the project method the most desirable.

With this method general instruction is impossible, for each student is confronted by a peculiar problem at any given moment and, either must proceed without instruction, or wait until his turn comes, with the resultant slowing up of production. Another disadvantage of the project method is that the pupil does a little sawing now and then, proceeds to do a little gluing, and so on around the cycle of processes necessary in the completion of a piece of work. By the time he gets back to the sawing he has forgotten most of what little he had learned and must start all over again. Even if the instructor does have sufficient time to give thorough instruction, the pupil does not have enough practice at any one time to fix the process and consequently spends a good part of his time relearning what he already should know.

E. L. Steenrood says: "In the average-size manual training classes the individual project method is unworkable and the wonder is that schoolmen have not learned that long ago. It is physically impossible to deal singly with the members of a class. While the teacher is helping one boy to a clear idea of his special problem the nineteen other boys are likely to be on the 'waiting list' with the resulting chaos so often seen in industrial classes. Again it is disheartening to contemplate the great waste of time and the resulting chaos the individual project method involves. If we do the most effective teaching we must systematize our work and that precludes the individual project."[1]

This seems to show that he has failed in teaching the individual project plan and therefore condemns it as useless in all cases. Other men have seen the flaws in the project method. Allen D. Backus says: "Of course while the instructor is doing this there are nineteen other boys waiting their turn to develop intitative and self-expression through the process of evolving good and original designs of tables, carts, etc."[2]

J. F. Dennis wonders "what is done to take care of the variation of speed that is found in any group of boys when the same problem is being made by them all?"[3]

The writer has recognized these drawbacks of the project method and also those of the group system and has devoted considerable thought to the evolution of a new method that would remove them. The method finally hit upon is a combination of both the individual project and the group method plans. Under this plan each boy is assigned to operate a certain machine or do some other specialized task for all the members of the class for a week. One boy will operate the saw another will do the planing; a third will do the gluing. The issuing of stock, grinding of tools, issuing of tools, each is the duty of one boy for an entire week. The pupils who do not have assignment work busy themselves on their projects, and those who are on assignment can use their spare time on their projects. Thus it is only necessary to check up the boys who have assignments.

[1]Manual Training Magazine, May, 1922. "The Project Problem."
[2]Manual Training Magazine, November, 1921. "The Project Problem."
[3]Manual Training Magazine, May, 1922. "The Project Problem."

A sample assignment sheet might be as follows:

ASSIGNMENT SHEET.
April 23-27, 1923.

Freshmen, section A		Freshmen, section B
Stasney	Foreman	Anderson
Bren	Planer	Brum
Feltl	Saw	Mitchell
Lindahl	Grinder	McNally
Blake	Stock Room	Elmquist
Johnson	Gluing and Assembling	Swenson
Tobias	Tool Room	Martin
Olson	Cleanup	Rundquist

This program is rotated every week.

In order that the work may be done in a business-like way, a card is filled out for each operation. For example, a boy who needs stock takes a card and indicates on it the number and the size of the pieces he requires. He hands this to the pupil in charge of the stockroom who issues the material and files the card. Cards are also filled out for each operation on the machines, so that at the end of the day the instructor can run through the cards and see at a glance the progress of each individual.

It is much easier for the instructor to discover poor workmanship by this method, for, although the boys may try to hide their own mistakes, they will report errors made on their projects by someone else. In this way the system checks itself.

The saving of time by the shop method can easily be seen by observing the saving at the saw alone. Under the old system there would often be two or three boys lined up waiting their turns. They had to stand there idle or forfeit their positions. Now with one boy doing all the sawing for a week, the other pupils bring their pieces to the saw properly marked and leave them there with a card bearing their names and instruction to the sawyer. The boys do not have to stand around and discuss the athletic "dope" but can go back to their benches and work on something else until their pieces are sawed out.

The element of safety is not to be neglected in the handling of machinery. With a number of boys waiting in line one might say to the one ahead, "Just let me have the saw for a minute to square up this piece." He would then hurry up to the saw and rush his work through without taking any heed of the ordinary precautions. This not only makes accidents more likely but encourages slipshod work. The State Inspector for the Prevention of Accidents said the system was the best he had seen in a school wood shop.

And the boys take pleasure in keeping their tools keen, if they can take them up and leave them to be ground while they work at something else. The boy who does the grinding will do more in a week than he would do in a school year otherwise.

And again each boy comes in contact with a greater variety of work than under the project system. Under that system he might not handle more than two or three different types of work in a year while under the shop system he has something to do with the models of all the boys.

What do the boys themselves say of the system? They declare that they learn more about the various machines and processes in a week than in a semester under the old system. As the system more nearly resembles a real shop than the project method does, the boys feel that they are doing man-size jobs and feel more responsibility and interest.

All the drawing for the course is done at the beginning of the term. The drawings are made with care and must include all necessary details of dimensions and joints. A neat tracing is made of each project for the office files. It is necessary that the boys understand the drawings perfectly before they go into the shop. If a boy comes to the instructor while working in the shop with a question in regard to the size of a piece or the method of joining, he is referred to his drawing, and if the information is not there it must be put in. In this way the boys learn to follow plans and specifications.

The outstanding advantages of the shop system are:

1. One boy, and one alone, is responsible for the work at each machine or job and thus the work is easily checked up.

2. One boy working on one machine for a week becomes familiar with it.

3. A boy operating a machine or performing a process comes in contact with all the projects instead of becoming familiar only with his own.

4. The waste of time waiting for machines, tools, or instructions is eliminated.

5. The variation of speed in the project method is compensated for.

6. A better interest is maintained and a spirit of cooperation is built up.

7. Due to the business principles and more efficient management of the shop, twice as much work results, and it is also more accurate.

8. There is more time for instruction than under the strictly individual plan.

9. Larger classes can be accommodated.

After having worked with boys for several years in high school shops and studied the various systems, the writer believes that the shop method is the most efficient and effective methods of teaching manual training. It fixes the knowledge of processes and the habits acquired in good shop practice. And it does this without doing away with the desirable individual project.

How Complicated the Simplest Thing can be made was shown by an engineer, who said to a company:

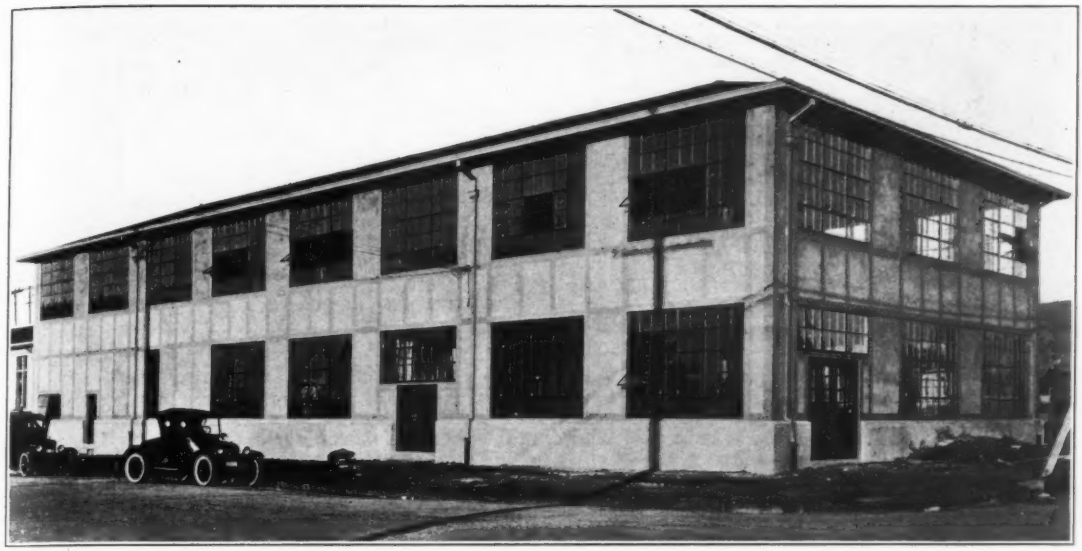
"This morning I went over to see a new machine we've got at our place, and it's astonishing how it works."

"And how does it work?" asked one.

"Well," was the reply, "by means of a pedal attachment a fulcrumed lever converts a vertical reciprocating motion into a circular movement. The principal part of the machine is a huge disk that revolves in a vertical plane. Power is applied through the axis of the disk, and work is done on the periphery, and the hardest steel by mere impact may be reduced to any shape."

"What is this wonderful machine?" was asked.

"A grindstone."



PREVOCATIONAL SHOP, BURBANK JUNIOR HIGH SCHOOL, BERKELEY, CALIF.

Industrial Arts Work at Berkeley, California

W. W. Patty, Director Vocational Education.

Recent Developments in Berkeley Junior High Schools.

THE former type of manual training for boys in grammar schools consisted almost exclusively of woodwork. In the Berkeley junior high school shops the industrial course now includes opportunities for prevocational training in machine shop, electric shop, radio, cabinet making, automobile operation and repair, sheet metal work, pipe-fitting, printing, cement work, shoe repair, elementary plumbing, home and school repair service, drafting, blue printing, designing, wicker furniture, bicycle repair, and painting. The Junior Red Cross and other charity organizations receive thousands of toys from this department each year for free distribution to poor children. The vocational counsellor supplements these activities by developing charts which show facts as to the permanency of various vocations, steadiness of employment, salaries paid, number employed, and opportunities to be had.

This type of "prevocational industrial" work seems to justify itself and is receiving more time in the junior high school program. Many schools are giving an hour or more each day for boys to secure these "exposure experiences." If this plan succeeds in reducing the number of "misfits" and materially aids boys in earlier and wiser choices of vocations and training courses, it is one of the significant contributions of the junior high school organization to the educational program.

A Junior High School "Finding Program."

The Berkeley junior high schools were organized to broaden the course of study offered to pupils in the seventh and eighth grades and to bridge over the gap that exists between the eighth and ninth grades. Its purpose has been to hold all pupils in school until the senior high school course would be completed by giving the younger pupils a peep into such fields as modern language and science, which had formerly been reserved for the senior high school alone.

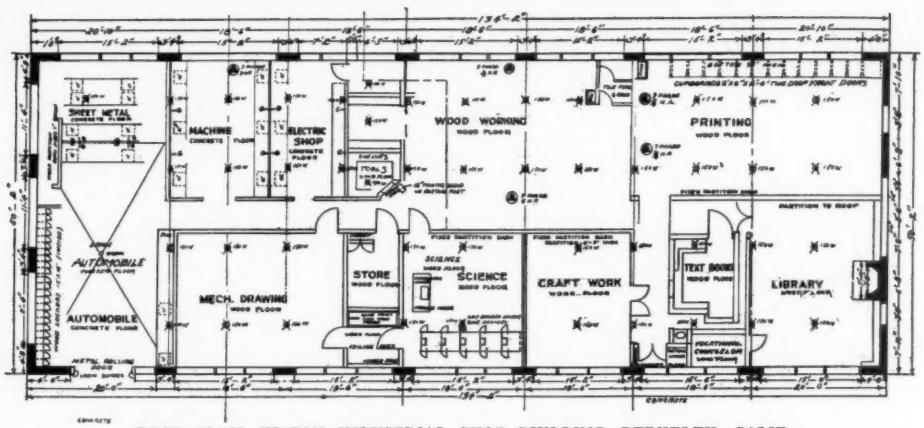
The results were encouraging but there seemed a need for something more; many pupils still failed to complete the senior high school courses; the school was still unable to prevent a large number from drifting into the "blind alley" method of finding a place in the world of work and industry.

The Edison junior high school has made a study of the facts concerning the number of its pupils who do not complete the full high school course or who do not go to the University. The data gathered showed that only sixteen per cent of the Edison pupils continued on to the university; that 84 per cent went no farther than the senior high school, and many failed to complete that course.

Other data covering all of Berkeley showed that out of 910 pupils entering the low seventh grade only 287 completed the twelfth grade. The figures were as follows:

VII grade	910
VIII grade	833
IX grade	697
X grade	678
XI grade	404
XII grade	267

Such studies conducted by Mr. H. H. Glossner, principal of Edison junior high school, Mr. J. F. Preston, principal of Burbank junior high school and Mr. W. W. Patty, director of vocational education, not only convinced them of an unusual need for special emphasis on



ROOF PLAN, EDISON INDUSTRIAL SHOP BUILDING, BERKELEY, CALIF.

pre-vocational work at the Edison and Burbank schools but also enabed them to so present these needs to Superintendent Wilson and the board of education that new prevocational industrial buildings were erected at both these schools. Extensions in the kinds of shopwork offered have also been made at the Garfield and Willard junior high schools. (Somewhat similar provisions are made for pre-vocational work in home economics, agriculture, commercial subjects, music, art, and pre-professional subjects.)

The general aims and purposes of these shops is to give the boy a controlled set of experiences in a selected group of occupations in order that: (1) he may have a basis of determining whether or not he wishes to pursue further a more intensive training in any one of the occupations experienced; (2) that he may from first-hand experience gain in simple terms an appreciative understanding of the problems involved in the work of the world as represented by the selected group.

Details of the Plan.

The prevocational industrial work being developed in the Berkeley junior high schools may be well illustrated by a brief description of the work at the Edison school.

Edison Pre-Vocational Department as a junior high school Type.

The length of the school year is 40 weeks, divided into a fall semester of eighteen weeks and a spring semester of 22 weeks. The length of a period of instruction is 40 minutes. Shopwork is compulsory for all boys in the seventh and eighth grades. Ninth-year shopwork is elective. The number of shops is ten. The average number of weeks for each shop course is ten weeks.

The shop building at Edison junior high school was constructed as a separate unit to the school, at a cost of $20,000. It is a brick building of the factory type. The various shops are separated from each other by low partitions approximately five feet high. This enables the boys to observe the work of the various departments and to feel free to consult with one another concerning the project in question. It also aids the instructor, who supervises three different shops, in keeping in closer touch with the work for which he is directly responsible. The printing, general science and mechanical drawing departments, however, are separated from the other shops by glass partitions, owing to the nature of the work done in these departments.

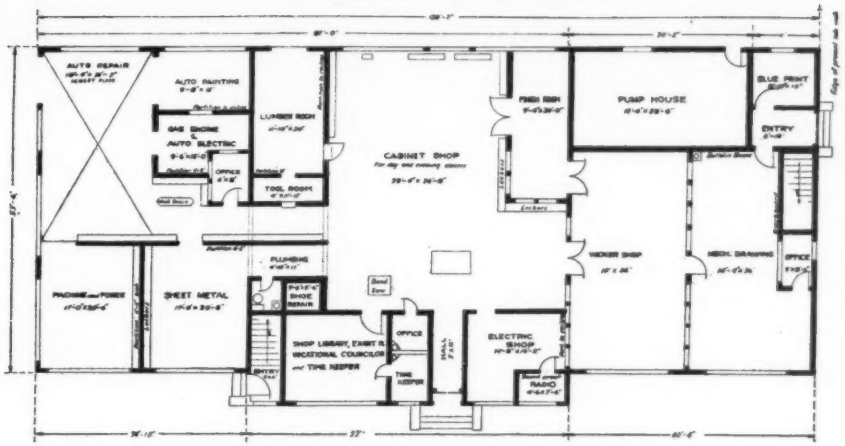
The number of pupils assigned to any one shop at a time is limited to ten. Each group has its own student foreman, carefully selected for his adaptability, and especially trained for the particular shop to which he has been assigned.

The equipment for the entire shop plant is valued at approximately $14,000. Additional equipment will be required from time to time, but it is the plan of the school to construct much of this in the shops, thereby training the boys as useful, practical and independent workers.

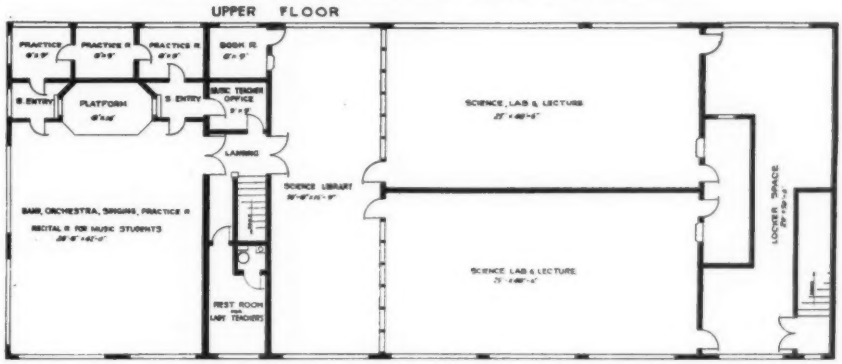
The teaching force in the Edison prevocational shop building includes: A librarian and vocational guide, a science teacher, a teacher of mechanical drawing, woodwork and electricity, a teacher of automobile mechanics, machine shop, plumbing and sheet metal, and a teacher of printing and bookbinding. The teachers of the academic subjects and the vocational counselor follow the shopwork of the boy and provide timely information, study, reading and advice.

In the Edison shops the duties of vocational counselor and librarian are combined. As vocational guide, the first duty of the counselor is to make a case study of the individuals at hand. In this study is included his tentative vocational choice, his parents' ambitions for him, his interest in and out of school, his abilities, his intelligence data and his general school standing.

As librarian the counselor is responsible for the purchase and maintenance of the shop library. She cooperates with the shop instructors. She learns what each is attempting to accomplish in his department and furnishes reading material that will meet his needs. The counselor must also keep a record of the reading done by each pupil, and, when the opportunity offers, suggest books in the line of work in which he seems most interested. The interest which a pupil evidences along



LOWER FLOOR PLAN, BURBANK JUNIOR HIGH SCHOOL.



UPPER FLOOR PLAN, BURBANK JUNIOR HIGH SCHOOL,

certain lines in his library reading is made a part of his case study.

The grade assignment and time allotment of industrial shop courses follow:

A. Low Seventh Grade.
   1. Mechanical drawing, sketching, blue print reading .....10 weeks
   2. Printing and book binding.....10 weeks
B. High Seventh Grade.
   1. Electricity and radio.....10 weeks
   2. Wood working .....10 weeks
C. Low Eighth Grade.
   1. Plumbing and sheet metal .....10 weeks
   2. Machine Shop .....10 weeks
D. High Eighth Grade.
   1. Automobile mechanics .....20 weeks
E. Ninth Year.
   1. In the ninth grade the pupil may elect mechanical drawing, printing, automobile repair, cabinet making or electricity, including radio.

The method used in each subject presentation is the same. The pupil is given an "exposure" to a controlled and selected set of experiences, representative of the industry in question. He works out projects. He listens to lectures. He takes trips to nearby factories, shops and stores. He acquires a viewpoint of the industry he is studying. Since the primary object of the shop is not training for a vocation, the teaching of those processes that lead to the acquirement of skill is not stressed. However, an effort is made to keep the work at as high a level of skill as possible.

SUMMARIZES VOCATIONAL GUIDANCE.

The value of vocational training and guidance was recently summarized by Dr. John Dewey of Columbia University as follows:

"The defect of education has been a failure to emphasize control and relationships of the human element" in industry as well as everything else. Unless we do get at the inwardness of the situation as represented by the adjustments we make with each other and with society as a whole, no external changes, in salaries, working conditions, or hours of labor, will help. The school is the logical and only agency that can bring about an understanding and make people capable of normal adjustments.

Vocational education, acting as it does as the connecting link between school and life activities holds a stategic position for bringing this about. The larger phases of vocational education suggest the possibilities of a program for linking all education with life.

1. Vocational guidance can be carried on in schools. Guidance, by putting the right man in the right place, will increase the individual's capability to adjust himself, raise his self-respect by making him an habitually successful man, give him contentment and self-sufficiency.

2. The school can connect up with life by giving all pupils a knowledge of industrial conditions and acting as a clearing house for industrial managers who want workmen and boys and girls who want work.

3. Follow-up work of the sort that makes a special effort to help the lower end, the drifters, has the possibilities of raising the general level of industry by establishing a human contact in industry. The human element is possible and valuable.

4. Finally, the vocational department can become a center around which various organizations can gather, and, thus, through its connection with the school, hasten the time when the school will be the natural center of all public agencies and welfare organizations. To bring that about in the near future must be our program.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN

Editors

EDITORIAL

LONG AND SHORT.

"The young teacher is usually long on technique and short on intelligence."

This statement is taken from recent correspondence with a teacher of teachers but we do not believe it. This conclusion with regard to Industrial-Arts teachers suggests to us either a mistaken impression or a misstatement. Probably the latter.

Technique implies the process or method of doing things.

Intelligence implies alert mentality. We do not believe that young teachers as they are now equipped for school work are proficient in doing things relative to what they teach and we do not believe this inability shows a lack of intelligence.

The subject matter of common school teaching is fairly well acquired in our Normal schools but to teach a subject requires a wider knowledge of the subject than the subject matter taught.

As school subjects increase in scope a general knowledge of related matters becomes necessary. The manual training of a few years ago consiststed of a few definite operations with tools and wood. Now it is related to a great variety of trade and industrial activities. Drawing in the name of Art is now altogether inadequate for the impression of good taste in design.

The teacher of any kind of industrial art must have much more experience than can be crowded into the brief two years of Normal school training before he can be "long on technique."

As for intelligence; we are inclined to the belief that the American youth is superior to most. Some foreigners and some of our cock-sure business men assert, with the assurance of a great discovery, that our American school product is superficial and incompetent. Americans who have been engaged in training the youth under our school conditions have known this for many years.

They know that all youth is superficial and incompetent and that school training can never make competent professional men or women. Perhaps our American youth is more superficial than others.

American youth is relieved of responsibility by our social and civic conditions. We pride ourselves on giving our boys and girls a long and enjoyable youth. Perhaps we help them overmuch in their play and work. They may be consequently dependent and lack resourcefulness but they are not unintelligent.

The young teacher has had meager training in the subjects he teaches and in the methods of teaching, but the standards are being raised as conditions allow. The young teacher is not long on technique or short on intelligence. He is usually a good teacher in the making.

SUGGESTIONS.

The editors of THE INDUSTRIAL-ARTS MAGAZINE are anxious to secure suggestions of topics that need emphasis and exposition.

A few such topics have been given in recent correspondence by teachers of the building arts. They are courses of study and teaching methods of estimating for carpenters and builders; blue-print reading and architectural drawing for carpenters and builders.

These needs will be supplied as we can secure good material on these subjects, and we hope to hear from teachers of experience in these lines of work. No arts have changed more rapidly than those pertaining to building. New materials for building are added each year some of which require particular treatment. Ready made forms of lumber, metal and composition are flooding the market and the old hand-made home bids fair to be replaced by a ready made house or apartment that will have ultra modern conveniences and will require judicious putting together over night. Mr. Old Timer can scarcely supply the information for a builder's course now a days. Here is the opportunity for a market expert as well as tradesman.

With all of this change in building convenience and construction come changes in designing and estimating.

While lumber is still figured in board feet; brick by the thousand and plastering and painting by the yard; there are so many kinds and uses of each that the designer, draftsman and estimator must be wise to many things. Perhaps he should be an artist as well.

With all of these changes the tent maker is coming to his own.

VISIBLE FAIRIES AND OTHERS.

Much may be expected from Visual Education when the conceptions that are desirable for school development can be secured and operated so that the child may see the activities and facts of nature, industry, science and art displayed in the schoolroom. To be most helpful this display of the interest of life must be both truthful and fanciful.

The great truths of nature, industry and science must be represented and the fanciful conceptions of art that are revealed through the gifted minds that do not confine themselves to facts must be impressed.

The normal child believes in fairies; the normal adult does not. The child who believes in fairies and their operations but conceives them as quite apart from himself gets little more than entertainment from the belief. The child who plays the part of fairies can do things that rivals the accomplishments of fairies.

"Mary please find the broom." "I can't," replies Mary after a very little effort. "Oh! How I wish that a good fairy named Mary would find the broom." Mary bocomes a fairy and after flitting about as fairies are supposed to flit, the broom is found. What teacher has not inspired a child to become an accomplished fairy and do the impossible?

Children may see very good fairies in story or movie and not be inspired to do or try to do what the fairies do. It is only when the child becomes a fairy that he can do things especially well.

The inspiration to do may never come from visual education.

Who is more prosaic than the self-satisfied globe trotter who has seen the wonders of the world at first hand? His one virtue may be his ability to tell others about these wonders and now with visual education we can sit comfortably and see them ourselves. Most of us are a little vain of what we have seen.

The witness of any unusual performance is usually fond of telling about it, as if it reflected credit on him to have just observed. The streets of our towns are lined with idle onlookers who seem to be hoping for something unusual to happen. Watching the other fellow do things is a popular pastime.

Doing things under inspiration would prove most of us fairies but we may never hope to accomplish much by watching the other fellow. It requires the inspiring teacher to make real fairies.

VALUE OF WORK, PUBLIC CONFIDENCE, AND THE COST OF EDUCATION.

Now of all times is the time for teachers of the industrial arts and vocational subjects to avoid any appearance of extravagance or indiscretion. These subjects by intimation and inuendo are being attacked. They are being attacked from one of the most dangerous, plausible, and innocent looking angles, namely, the angle of cost and economy. When everything else fails in this country, the resort of the alarmist and the demagogue is the cry of *expense.*

Summer is the great time for revising courses, planning new equipments, building new buildings, and taking other progressive steps. There is no call now for great retrenchment or a niggardly economy which in the end is the most wasteful extravagance. The call is for discreet planning, wise buying, and such organization and preparation as will make possible the maximum use of every piece of equipment. The American people are not going to be so much concerned about *how much* our work costs as they are about *whether it is worth the price.* It is our task to meet the issue on this basis and to prove again and again that the industrial arts and the vocational courses return value received with interest compounded in the nature of clarified vision, enriched life interests, discovered talents, intellectual and moral growth, and actual commercial efficiency.

Any community or school system that can show such returns need never fear the cry of the alarmist or the so-called "educational philosopher" who uses a sordid argument to cover up an ulterior motive.

The arts in all their forms, the industrial education, the vocational courses, the part-time schools are here to stay. They are meeting, perhaps imperfectly, but nevertheless surely, some very great needs in our educational system and in our social and industrial life. The American people realize this fact and they will continue to pay the price as long as the work progresses and provides intelligently for the practical and aesthetic training of their boys and girls.

A JOINT MEETING IN ST. LOUIS?

There is some discussion now among the officials of the National Society for Vocational Education and the Vocational Educational Association of the Middle West as to whether a joint meeting is advisable again this year.

There are some reasons why such a joint meeting might be highly satisfactory and profitable for both organizations. There have already been two such meetings. In the main, and with the exception of some minor considerations, the meetings were highly successful.

If another joint meeting is to be held, it is our opinion that some very definite understandings should be entered into by the two organizations. It is vastly important that a specific agreement be made and kept concerning such questions as that of memberships. It is important that at the meeting there shall not be a competitive bidding for members. It is important that all pre-convention arrangements that will affect this meeting in St. Louis in the several states shall be made *in conference* and in the spirit of *cooperation.* A *joint* meeting should not be joint in order to get the crowd, and then competitive in order to get the *members.*

Another question that in practically all joint meetings is a difficult one to adjust is the question of the equitable distribution of the responsibility and expense, and the proper division of the proceeds. We assume that the two groups of officials are thoroughly cognizant of the importance of the above suggested problems, and that perhaps they are already at work on their solution, so that the proposed joint meeting may be a benefit to both organizations and not an injury to either.

St. Louis is a great meeting place. It is thoroughly alive to the significance of vocational education. It has some of the real leaders of this work in its own midst. Its school officials are in hearty accord with this work and with every effort to make this a great meeting. Whether joint or otherwise, it will be the national meeting of the year, and people who are interested in vocational education cannot very well afford to miss it.

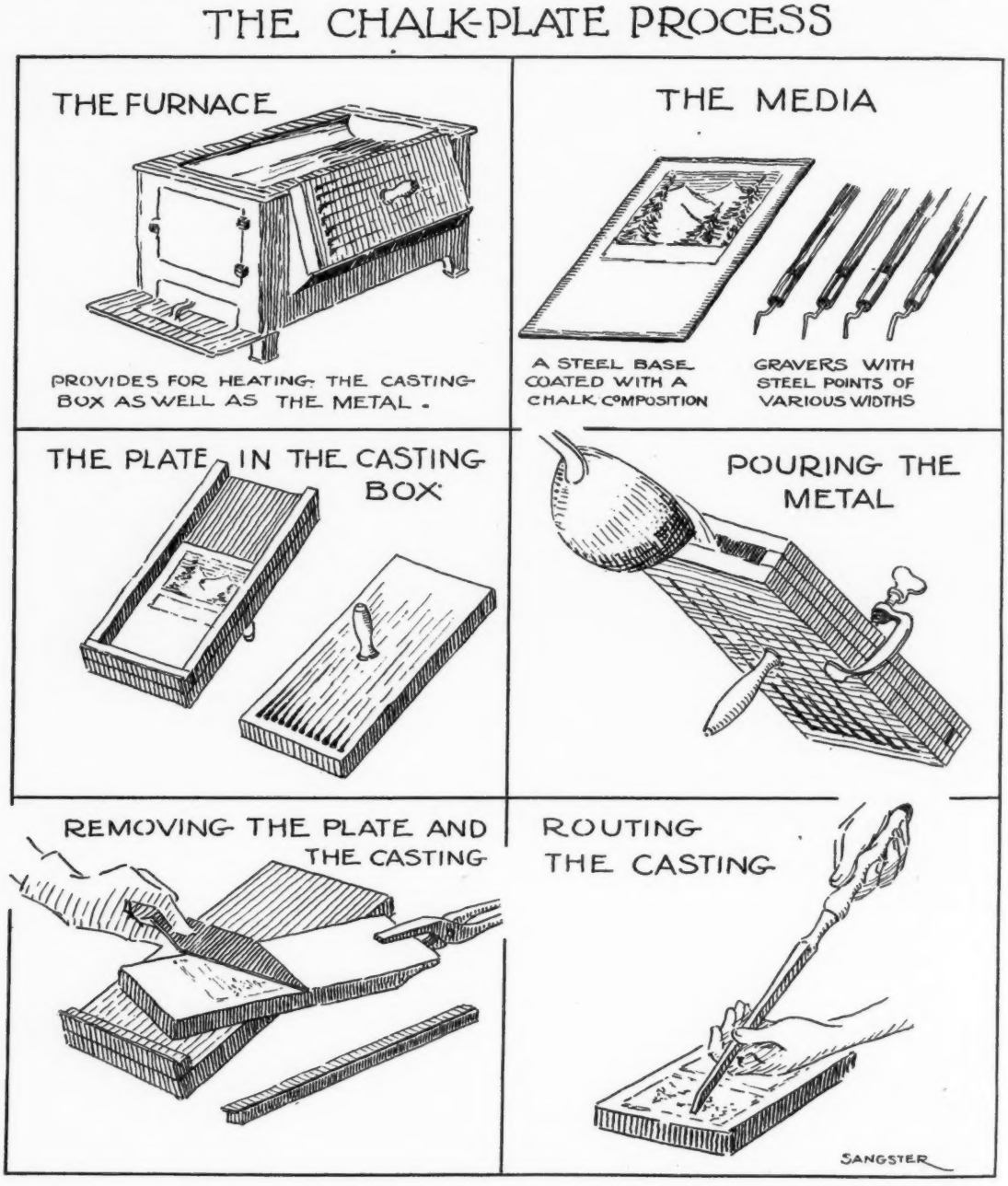
Mr. J. D. Blackwell, formerly in the Pennsylvania Vocational Department, has been appointed State Director of Vocational Education for Maryland, succeeding Roy Dimmitt. Mr. Blackwell has for the last two years been employed as assistant director of vocational education in Pennsylvania in charge of agricultural work. He has been engaged in school work for a good many years and will receive a master's degree from Columbia University this summer.

The Chalk-Plate Process: A Practical School Art

Frank Sangster, Industrial Arts Department, The Scarborough School, Scarborough-on-Hudson, N. Y.

The general and rapid growth of printing as a school activity, has created a demand for some method of reproducing a drawing which will be practicable under ordinary schoolroom limitations. Teachers have realized that the preparation and printing of cuts add zest to the work and open up a fascinating side of the printing craft. Perhaps the most successful medium for this purpose in general use, is the lineoleum block. A piece of "battleship" linoleum, glued to a block to make it type-high, furnishes a delightful cutting surface and produces prints which are often effective, indeed. The scope of block-printing is definitely limited, however, since the highest degree of skill is necessary to obtain anything approaching a fine line.

For the reproduction of line drawings, the writer has, for fifteen years, been using the chalk-plate method in schools. This process, not only is infinitely broader in possibilities but also approaches modern industrial practice, and opens up numerous allied industries. The method was in common use in newspaper plants before the


THE CHALK-PLATE PROCESS
THE FURNACE
PROVIDES FOR HEATING THE CASTING BOX AS WELL AS THE METAL.
THE MEDIA
A STEEL BASE COATED WITH A CHALK COMPOSITION
GRAVERS WITH STEEL POINTS OF VARIOUS WIDTHS
THE PLATE IN THE CASTING BOX
POURING THE METAL
REMOVING THE PLATE AND THE CASTING
ROUTING THE CASTING
SANGSTER

APPARATUS, TOOLS AND PROCESSES, USED IN CHALK PLATE ENGRAVING.

EXAMPLES OF CHALK PLATE PROCESS ENGRAVING PREPARED BY HIGH SCHOOL STUDENTS.

1. The original of this Christmas card measures 3½ x 2¼ inches and is printed in black and orange. 2. The original of this card measures 3¼ x 2¾ inches and is printed in three colors—a dark grey, a light grey and a bright red (for the sun and the roof of the house). 3. This card is printed in delicate grey and green. 4. This is the front cover of a four page circular containing an announcement and a list of exhibits. 5-6. These interesting inserts in a school annual were printed in red and black. The stock used was a rough cover paper in a faint sepia. 7. The cover of a booklet containing high school yells. 8. A two color job in black and red. 9. The interesting cover of a souvenir booklet printed in silver bronzing on a heavy grey cover stock. The letters are embossed and a square surrounding them is blind stamped.

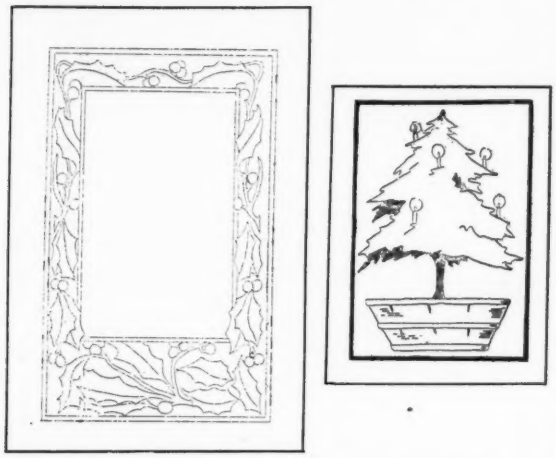
advent of the photo-engraving process and is still used in plants of moderate size and as an adjunct to the equipment of some of the most extensive plants.

This article was prompted by the apparent lack of acquaintance among printing and craft teachers with this simple and efficient process. It is hoped that, in addition to introducing the craft, sufficient instruction may be furnished to enable anyone of artistic and mechanical ability, after a little experience, to succeed with its execution.

Very briefly, the process consists in engraving the drawing on a chalk-coated steel base; this chalk-plate then serving as a matrix for a metal casting or "stereotype."

The draftsman begins by preparing his plate for the engraving. The chalk coating on the plates, as they are purchased, is thicker than is necessary for most subjects. The chalk is reduced to the proper thickness by scraping with a brass rule. A thin coating of chalk furnishes less resistance to the graver and makes possible the rendering of delicate lines. On the other hand, a casting from a thin plate which contains numerous white areas will require considerable routing. The nature of the particular drawing, then, to a certain extent, determines the desired thickness of the chalk. A drawing composed of simple black and white areas may be engraved in thick chalk and will require little routing, while one composed of delicate lines is much more readily done in thin chalk.

Beginners, and even experienced workers in this medium, benefit by a few guide lines on the chalk surface. A drawing may be roughly transferred to the chalk by pinning the paper over the plate and tracing with a hard pencil. The resulting indented lines will be found quite sufficient as a guide. Of course, only the main outlines should be transferred. The draftsman now selects a graver that will give him a line of the proper weight and begins his engraving, taking care that each line cuts entirely through the chalk to the steel base. The direct effect is very similar to a pen and ink drawing; the strokes of the graver revealing the steel base in black lines against the white chalk. It should be noted that the drawing is not reversed, as is necessary on a wood block or an etching,



SIMPLE EXAMPLES OF CHALK PLATES PRINTED ON HEAVY STOCK FOR HAND COLORING.

since the casting process accomplishes this reversal. Lettering, for instance, may be drawn right side to. The chalk adheres rigidly to the base, insuring a sharp line, and shows no tendency to chip away, as might be anticipated. The finished plate is now placed in the casting box and locked up. The nature of the casting box and the device for securing the plate may be seen by reference to the accompanying illustration. It will be noted that this casting box consists of two thick cast-iron plates fitted with wooden handles to facilitate handling when hot, also three cast iron bars grooved and flanged to provide a tight fit about the plate. These bars may be had either type-high or thin. If thin bars are used, it becomes necessary to mount the casting on a wood base. The writer prefers type-high bars which produce castings ready to be put on the press, either alone or with type. The greater amount of metal necessary for thick casting is not a serious matter, since the cuts may be melted and the metal used over and over. The casting is done in ordinary stereotype metal. In fact, old plate matter, which may be readily picked up in small newspaper offices or business houses which use plate matter in advertising, seems to be fully as good as new metal. Old electrotypes may be used, since the copper shell may be skimmed off after the softer metal backing has melted. While it is entirely possible to melt enough metal for a small casting directly in the ladle over a gas burner, a small metal furnace, such as is shown in the illustration, is desirable and really necessary for plates of any considerable size. Such a furnace may be had for either coal or gas. It is necessary to have all parts of the casting box, and the plate itself, hot when the metal is poured. Provision is made for heating these parts on the sides of the furnace while the metal is melting. The cast thoroughly hardens in a few minutes. The box may then be opened, the casting removed with tongs and the plate lifted off. A successful casting may be recognized by its dull sheen; a poor one, resulting from too little heat, is bright and often porous. A casting rarely fails because of too much heat.

When the cast has cooled sufficiently, it is sawed to the required size. A very satisfactory equipment for cutting these blocks, is a 26" back saw in an ordinary mitre box.

As suggested earlier in this article, routing will usually be necessary. That is, blank areas of any considerable size are likely to receive ink from the press rollers and so, "print up." All such areas, then, must be cut deeper with a chisel. Three or four chisels, ranging in width from ⅛" to ½" are desirable. Large, simple areas may be roughly chipped off with a wide chisel and a mallet but great care must be exercised in routing delicate spaces. For this work, a narrow chisel should be held almost vertically with the bevel up and should be pushed along with a slight twisting motion. The routing finished, the cut is ready for the press.

Cuts for two or more colors may be successfully made by engraving all colors on the same plate. This insures a perfect register when one cut is printed over another and also economizes on plates. In this method, the lines or areas for one color, are engraved on the plate and this engraving is cast. Then, on the same chalk plate, another color is engraved. The second casting will contain the first as well as the second color areas. It will be necessary, then, to rout from the second casting the areas corresponding to the first color. In general, the castings for the lesser color areas should be made first, however, this is not an invariable rule; experience and judgment are necessary for determining the order for intricate color arrangements.

If the process appears somewhat technical, the reader should be reassured by the fact that the writer, without previous experience in the method, succeeded in directing a group of high school students in making all the line cuts, including several in two colors, for the illustration of their year-book. Since that time the process has been put to a variety of uses by high school and even upper grade pupils in various parts of the country.

Teachers of printing will readily appreciate the possibilities of this process for enriching their work and art teachers will recognize its value as an outlet for practical school drawing and design.

Correlation of Drawing and Shop Work

M. F. Kavanaugh, Supervisor, Springfield, Ill.

Drawing is closely correlated with shop work in the Springfield, Ill., department of industrial arts. Before entering the shop each member of the class in woodwork has in his possession a complete detailed drawing and a mill bill of the article he expects to make. This drawing is the result of his efforts in the design course.

The student is now ready to take up directly the work of selecting the material for his project. Here he makes the first use of the mill bill. Generally the more important or largest items on the bill, such as table and buffet tops are selected first. If there is sufficient storage space for the individual material it is found desirable to complete the work of getting out the stock before starting the bench work. If the class is a large one, it is not possible to follow this rule exactly without loss of time. This depends, too, upon the mill equipment.

Before cutting up any of the material, a brief lesson is given on the methods of scaling and computing lumber. As a practice, each pupil is required to figure the amount of lumber needed to complete his project.

Up to this time it is assumed the students have not had training or practice in the manipulation of woodworking machinery. Therefore, the first task of the instructor is to give a very thorough demonstration on setting up and operating the machines to be used. Special stress is laid upon the danger of careless use of the circular saw, planer and jointer, and this is followed by careful coaching of the pupil as he uses the machine.

It has been found in our experience that some members of the class are not apt enough to be permitted to do this part of the work. As the danger of injury is too great in these instances, the instructor or a pupil selected as assistant may mill the work stock.

The material ready, the students are assigned benches, and instruction is given in tool grinding and sharpening. The students now make use of their drawings and are re-

quired to follow these closely in all details. In this the student discovers the necessity of complete dimensioning in a working drawing. Any mistakes or incorrect proportions evident in the finished article are noted on the drawing, also improvements in construction which may be made are recorded. The drawings and notes go back to the drafting shop and new drawings are made with the corrections incorporated. Preferably each student corrects his own drawing if circumstances permit.

This method of having the student design his project and make a complete drawing before entering the wood shop is in contrast to the very common practice of having a class come into the shop with nothing more specific than an idea that the student wants to make a table, a chair, or a lamp. If there happens to be a drawing or blueprint to fit the occasion, all is well. If not, the student looks to the shop teacher for help and takes no responsibility himself. The teacher must plan hurriedly the different pieces, or at least enough of each one to permit starting the work. Generally he becomes a walking encyclopedia to whom the student refers for the length of this and the width of that. The instructor is called upon to make snap judgments where thought should be given, and invariably the results in the form of finished pieces show it. If this is not the case then we have the condition that the students attempt to make a sketch of the intended project, always poorly made and only partly dimensioned. This is due to the fact that the instructor must give an increasing amount of his attention to preparing the stock and instructing the pupils first ready for the benches.

It generally happens that the conditions in the shop are not favorable to drawing of any kind. The main drawback is that the pupil is not in the mood for drawing, because he is eager to start his project on the bench and not on paper. The drawings thus made are hardly more than a suggestion of what the finished article is to be. Consequently all through the course the instructor has an endless number of questions to answer regarding the details of each boy's problem. The condition is little better than in the first method, or lack of method. The results differ little. In both cases the pupil has wasted much time. He has not had the experience and interest that comes from planning, with suggestions from the instructor, on all the details of his piece of work. It fails to do one other important thing—that of developing responsibility in the pupil.

It is generally true that the average manual training shop does not follow very closely modern commercial design in furniture, which with few exceptions is good. Unless the study of design is given a definite place in the course of study, and pupils are taught to prepare their drawings before entering the shop, the projects in most cases will be crude and ill-proportioned. A wider study and use of drawing should be encouraged.

How Cement Bricks are Made

Vera B. Edwards.

WITH the recognition of cement bricks as a product of superior merit in the construction of buildings—because they are dampproof or impervious to water, and fireproof—and because of their flexibility to beautiful and artistic designs for not only buildings, but chimneys, ornamental fire-places, or any place where ordinary clay bricks are used, their manufacture has become a subject of general interest.

Concrete, by its nature, must be tamped to make a perfect product. The tamp process, then, is the one in which we are primarily interested and, therefore, dealt with herewith.

The operator of a brick machine, which we will assume is a power-driven machine, before beginning operations, see to it that it is on a firm and absolutely level foundation. This is very important and necessary in order to obtain the maximum of efficiency with the machine. With all equipment and materials in readiness, the operator first prepares the mixture. For ordinary cement bricks, a mixture of 4 to 1, that is, four parts of sand and fine gravel to one part of good cement, is used. This process consists of first mixing the materials dry, very thoroughly. In small plants this mixing is done in a box with the use of a hoe. In large plants concrete mixers are used and the materials are mixed with a sort of churning process in a revolving drum. After the dry mix, enough water is added so that the material may again be mixed, to such consistency that it will maintain its shape when squezzed in the hand. Gradually, then, more water is added until the proper consistency is attained, when the mixture is ready to deposit into the mold compartment of the brick machine, for tamping.

The mold compartment of the average power driven brick machine consists of ten molds, (permitting that number of bricks to be molded in one operation, with one machine, which is referred to as a "unit" in a large factory) which molds are of the exact size and shape of the bricks to be manufactured.

The mixture is deposited into these little compartments or molds, with a hand shovel, up to and even with the top of the molds. This is what is called "one fill" and insures a perfect bond of the tamped material. Were only a portion of the mold filled with the material, this tamped, and then more of the mixture put in and tamped, div.sions would be made in the brick and the perfect bond of the material broken, and an imperfect product would result. The operator then pulls a lever and the iron tamps, one for each brick, drop in series; that is, one after the other in quick succession, onto the bricks. Thus each brick is tamped separately and individually. This tamping process requires only about four seconds. Each tamp on a power brick machine weighs approximately 28 pounds and, dropping eighteen inches or so, each brick receives a blow of about 300 pounds. It will readily be seen that with such force, there is bound to be a production of uniform bricks of maximum density and compactness.

The next operation is to shove back a lever that operates a device on the machine called the stripper and finisher, the purpose of which is to strip off the surplus material and smooth the top surface of the bricks. In other words, the surplus material is pushed back with the stripper and finisher, onto a plate to be used again in making the next set of bricks. No material is wasted.

With the face-down type of machine, or machine that manufacturers bricks face down, the next thing is to clamp quickly into place a pallet, either of steel or wood, on top of the bricks which are still in the molds; the molds are "rocked over" onto the pallet and released and, at the same time, automatically slid forward into receiving bars, and the compartment is again closed.

With the face-up type of machine, division plates are used between the bricks, the bricks are tamped directly onto the pallet, and the division plates thereafter removed, leaving the molded bricks on the pallet ready to be carried away.

With either the face-up or face-down method, the bricks are now ready for the off-bearer. The operation throughout is a speedy one, and a tremendous capacity per day is obtained in a factory where several "units" are employed, relative capacity according to the number of machines used.

The bricks at this stage, which are known as "green," are left on the pallets a few hours before being handled. To handle them while green would get them out of shape and jar the corners off. Where there is a big capacity, one will readily realize that a large number of these pallets are required. These pallets of bricks are stacked in long rows, where they are left for a period of four or five hours, and then splinkled slightly with a fine spray, left for another period of eight or ten hours, and sprinkled again. Then after several hours more they are removed from the pallets and stacked up, one on top of the other, for permanent curing. They are never permitted to cure in the rays of the sun, as concrete cures much better in a cool place. Perfect curing requires from ten days to two weeks, after which the bricks are ready for building purposes.

Fancy Faced Bricks.

The best, and only dependable fancy facings for cement bricks are mineral colors, granite and white sand. Painted bricks have not been found dependable or artistic, and are almost sure to craze. Shades and tints, too, have proven more artistic than pronounced colors.

The usual method employed in applying fancy facings to cement bricks, is to mix the facing materials with dry cement and then to add enough water to produce what is called a semi-dry mix. The thickness required for the facing depends chiefly upon the kind used, and the operator determines this with a few tests and experiments. With the face-down method of brick making, the facing material is first spread evenly in the bottom of the molds, either by hand or with patent facing devices furnished with the machines, and the ordinary mixture filled in on top. When the molds are rocked over, the bottom of the brick will be the "face."

Made with the face-up type of machine, the colored facing is put on the top of the bricks in much the same manner that frosting is put on a cake. While the bricks are still in the molds, smoothed off, sufficient water is poured over the top to make them sloppy-wet, a little pure cement is added, then the coloring matter is sifted into this soft surface through a sieve, as cocoanut or chipped chocolate is sprinkled onto a cake before the frosting hardens. They are then cured the same as common cement bricks.

The Construction of a Crystal Detector Receiving Set

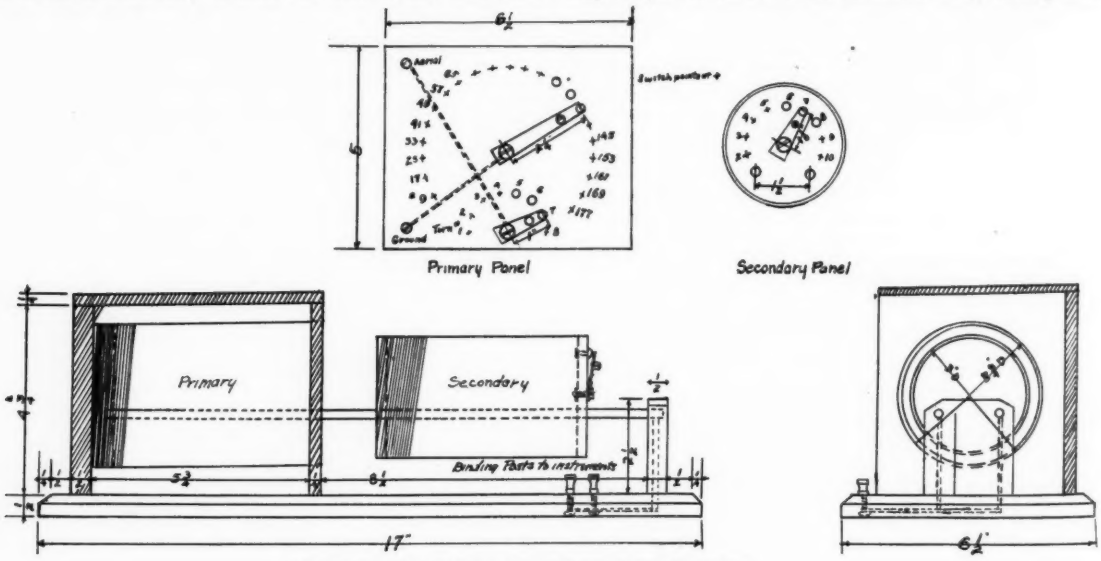
Gordon A. Harvie, Instructor of Manual Training,
Lincoln Grammar School, New Rochelle, N. Y.

The construction of a crystal detector receiving set is not only a project of especial interest just at this time to grammar school boys, but one that provides them with work in other materials, as well as wood, and the handling of the tools used in working metals, such as tin snips, drills, taps and dies, and the hack saw. It also provides a fine opportunity for the instructor to introduce some principles of electricity and magnetism and science.

In the Lincoln School, a group of interested boys formed a Wireless Club, and have worked on regular class time, spare time and at home on sets that work well and are inexpensive to make. No set has cost over two dollars, exclusive of the head phones. Various kinds of sets have been made, some using for the transformer a straight tuning coil, and others a vario-coupler or a loose coupler. The latter is most popular as it allows for close tuning and gives a range of more lengths of from two hundred meters to fifteen hundred meters. It allows reception of broadcasting from the different 360 meter wave length stations in the New York City district and New Jersey, and from the 1450 meter wave length signal corps station on Bedloe's Island in the harbor, over distances of 35 miles regularly, and when conditions are especially favorable, from stations of great strength from much longer distances.

With the exception of the wire, all the material for the set was brought from home or found around the shop or in the janitor's "junk box." The primary coil of the loose coupler was usually wound on the tube formed of an oatmeal box and the secondary on a box, such as oysters are packed at the fish market, being about 3¾" and 3" in diameter respectively. To increase the wave length range larger tubes were used.

Number 24 wire was used for the primary, a strip of tire tape first being put around the tube at each end, with one edge of each strip flush with the end of the tube, to prevent the turns of wire from slipping off the end of the tube. Three holes were punched through the tape and tube, and a twelve inch end of the wire was woven through them and drawn tight. Then the tube was filled with a single layer of turns of the insulated wire, ending about



LOOSE COUPLER SHOWN WITH PANELS REMOVED.

⅜" from the opposite end on the tape and a twelve inch end was woven through the holes in the tube as at the start. On a six inch tube about 180 turns can be placed close together and pulled snug.

The secondary coil was wound in the same manner, using a five inch tube that had been shellacked inside and out and No. 27 wire used. Be sure to wind both coils in the same direction.

For adjusting the wave length of the primary either a "slider" was used or "taps" taken off every eight turns. The latter makes the neater and more efficient job. To get as fine tuning as possible the first eight turns were tapped individually and then a tap taken off every eighth turn, making about 28 in all. The tap leads to the switch points were made of No. 24 wire ten inches long, wound into a spiral around a ten penny nail, to keep them out of the way when soldering, and the insulation was pushed back from the end and the end bent into a small hook. A small wire brad was forced under the turn to be tapped, a little of the insulation was scraped off and a drop of soldering paste put on, and the tap lead was hooked under ready for soldering. The taps should be "staggered" far enough so that the wires will not touch each other.

When the tap leads were soldered, a panel with a large and small switch arm and contact points suitably placed, was made ready. The switch arms were made of spring brass and the contact points of split rivets. As shown in the drawing of the panel, a wire was run from the aerial binding post to the pivot of the short switch arm, and the eight individual wire taps were soldered to the eight contact points. The other taps were soldered to the other set of contact points and a wire was run from the pivot of the long switch arm to the ground binding post. The secondary taps are taken off every half inch, and the leads run inside the tube, so they will not interfere when the tubes are coupled.

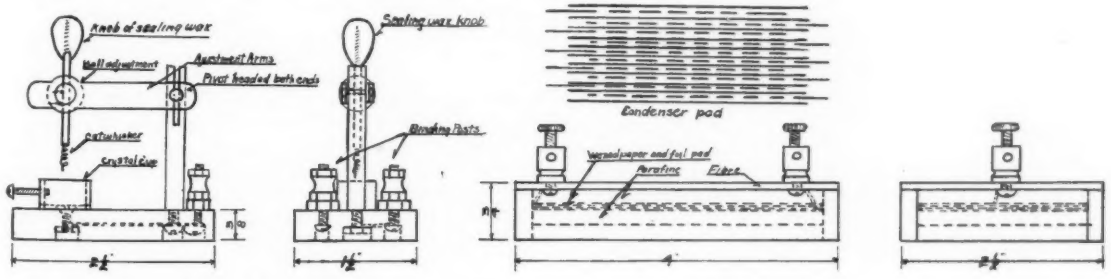
The panel for the secondary is a disc of thin wood to fit tightly into the end of the tube. The end of the wire is left free to be attached to one of the brass slide rods and the first tap soldered to point number two in the drawing, the second to point number three and so on, the final end of the wire of the coil being soldered to point number ten and a wire fastened to the pivot of the switch arm to run to the other slide rod. A disc should also be fitted into the other end of the secondary tube and holes drilled for the slide rods.

A box to house the primary can be made as shown in the drawing and, when the primary panel is mounted on it, can be secured to a base long enough to allow the secondary to be pulled entirely clear of the primary and to hold the slide rod support. The rods should be of brass about one-eighth inch in diameter. The wires from the beginning of the secondary winding and the secondary switch arm should be soldered to the rods as far inside the primary housing as possible. Wires are also run through the rod support at the other end of the base and secured to the binding posts to which the detector and condenser are attached.

A detector that provides for easy adjustment is shown in the drawing. The dimensions are not critical and so are not given. The material was all found around the school, the base a piece of composition cut from a discarded annunciator system block, the binding posts from an old bell; the upright post, a piece of brass rod; the spring brass clips to hold the "cat whisker" adjustment, from a broken window weight fastener; the brass ball for adjusting the cat whisker from the hammer of a bell; the brass rod passing through the hole in the ball, a screw hook cut to length; the cat whisker, a piece of No. 30 spring brass wire; the knob, a piece of sealing wax was softened into which the screw hook was pressed; the crystal cup, a piece of half inch brass pipe with a threaded hole in the side to receive an 8-32 screw. The cup was soldered to a brass disk which was fastened to the composition base by a machine screw. To insure a tight contact between the spring clips and upright rod, the hole for the pivot was drilled three sizes smaller than the pivot, and a kerf was made with the hack saw lengthwise of the post and the pivot forced through the hole. The holes in the other end of the spring clips were made somewhat smaller than the diameter of the ball, the side adjustment being made by turning the ball held in the holes of the clips. The wire connections were made through grooves in the under side of the base. A wire runs from one binding post to the upright post, and from the other binding post to the screw holding the crystal cup to the base.

The fixed condenser was made by building up a pad of alternately placed sheets of waxed paper and tin foil. The foil was secured from sweet chocolate wrappers and the waxed paper from coffee and corn flakes packages. Any waxed paper will do that has no holes in it and no printing on it. Ten sheets of foil, 1½" wide and 3" long, and eleven sheets of waxed paper 2" wide and 3" long were used, and the sheets placed as in the drawing, the full lines representing the waxed paper and the dotted lines the foil. Soldering the four inch leader wires that run to the binding posts on the top of the box to the ends of the foil required some care to prevent melting the foil with the soldering iron. The box was made of quarter-inch wood with fibre top, 2"x3½" inside dimensions and ¾" deep. Paraffine was melted into the box to a depth of a quarter inch and when cool the pad was laid in and the box nearly filled with more paraffine on top of that. The lead wires were fastened to the binding posts on the under side of the lid of the box and the lid was screwed on, making the condenser ready for use.

To hook up the instruments, connect the lead-in wire from the aerial to the binding post on the primary panel marked aerial, and the lead from the water pipe ground to the binding post marked ground on the panel. In the secondary circuit, the detector and fixed condenser are connected with short wires, in series with the secondary of the loose coupler, that is, a wire leads from one binding post of the secondary to one on the detector, from the other on the detector to one on the fixed condenser, and from the other on the condenser to the other on the secondary of the loose coupler. The phones are connected to the fixed condenser, one end to each binding post. A variable condenser connected across the secondary helps to tune the set more sharply.



Crystal Detector Fixed Condenser

Itinerant-Teacher Plan for Vocational Training

Albert D. Brown, Galveston, Tex.

THE INDUSTRIAL ARTS MAGAZINE for August, 1922, had a splendid article by Prof Edward S. Maclin, professor of industrial education, university of West Virginia, entitled "The Itinerant Teacher in Vocational Education," outlining the plan by which miners are trained in that state under the department of mining engineering of the university. The state is divided into districts, and the districts, into centers. Each district is in charge of a teacher who visits the centers at regular intervals. The work is under the supervision of a man from the university who visits the classes and checks their work and gives expert instruction. This work is carried on at a cost of forty cents an hour for each class instruction, and is paid by the state which receives reimbursement from the Smith-Hughes fund for one-half the salaries paid.

The work that is being done in West Virginia is almost identically along the same plan that I worked out for myself. Until recently I supposed that I had produced something new under the sun. But I have learned that my system is already in operation, and has been for ages. The article referred to above deprives me of the honor of being the sole originator, but at the same time, it affords me a great pleasure. I am satisfied to have my work taken out of the class of visionary adventures and placed upon the plane of proved success.

Come to think about it, how do the girls learn music? and how have they learned music through all the ages? Under the itinerant-teacher plan. The girl furnishes the room, the instruments, and the music. The teacher goes to her home and gives her lessons at stated times, and assigns enough work to keep her busy till the next lesson. Is this plan a success? Ask the music teachers.

In connection with my work as manual training teacher last year, my director, Mr. H. U. Miles, instructed me to do some work along the line of vocational guidance. This I did. I began to discuss trades in my classes, and the first thing I knew, some of the boys had selected their trades and had gone to work. They had equipped shops and invited me to come and help them. I went. I visited my pupils in their own shops where they were proprietors, and gave them instruction. I announced that any time a boy should select a trade and provide a shop that a tradesman could work in and make a living, I would come and teach him his trade.

Now, I have my hands full. The boys will work. There is not *much* discount on that. I go from one shop to another after school and teach trades. After I have analyzed the course, I block it out into lessons that contain both secondary and primary work, teach the science and trade terms, and give practical demonstrations.

Boys like to work—that is, if it is the kind of work that they like. A boy that is not "cut out" for a certain trade ought not to have to work at it. What if Columbus or Franklin had been compelled to work at the trade of his father?

As a matter of fact, it does not make so much difference what a boy does. One trade is about as good as another. The only thing to decide is what the boy is interested in—what appeals to him. If a boy is interested in his work, he will work and study to improve. If he does that, he will accomplish something, produce things, and advance. If he does that, he will like his work. Then he will work more, produce more, and like his work more. And so forth, ad infinitum, in a circle. That puts the "w" on irk and renders life worksome instead of irksome. It puts oil into toil and makes it a pleasure instead of a drudgery. Interest is the great thing, the prime factor. Any time I find a boy interested in a trade, I can make a tradesman out of him.

The question often arises, When should a boy have a chance to play? The answer is, when he works. What is the difference between work and play? The one element that can enter into the operation that decides the class of the act is interest. If the operation affords pleasure, it is classed as play; if it is drudgery, it is called work. I imagine a game of baseball would be extremely laborious to one who does not enjoy it, while solving an equation in quadratics is a pleasure to one who understands it. I have had boys build toy boats in my shop. They worked hard, and seemed serious and earnest. They seemed to think their business was as important as Robert Fulton did when he built the Clermont. A course should be planned, and a trade should be selected that furnishes enough physical exercise to cultivate the body and enough mental problems to develop the brain. The business man who sits at his desk until his blood becomes sluggish, his limbs numb, his mind foggy, calls the office boy to take the exercise that he himself needs. The man who does that will soon feel the need of a vacation, whereas, if he should sandwich his paper work with errand running, he might be able to stay on the job twelve months in the year, and enjoy it. We all recognize the importance of physical exercise, or motor activity. But why not guide the boy's energy along the line of a useful trade? My boys work hard building bird houses or hat racks. They love to see the raw material converted into useful articles. At the same time they are building something infinitely greater than what they see; they are building useful men.

Training the boys to work is especially a matter of national concern. It is as patriotic a work as fighting the enemy in time of war. It is as important to carry on the great industries and lead in the world's work as it is to win a war. Labor freedom is as important as political freedom. We must produce more skilled laborers or continue to ship our raw materials to Europe to be manufactured. The more bales of cotton we ship to Europe, the more bolts of calico we shall have to buy in Europe.

Training the boys to work is a moral obligation of their parents. The old Jewish proverb, "He who does not teach his boy to work teaches him to steal," is true. Any time a boy is thrown on his own resources, and he cannot earn a living, he will steal. Sometimes a boy wants more money than he can earn, and becomes a grafter.

The greatest drawback to my system of schools is the lack of teachers. There are very few people who can teach a trade. Our teachers must be first of all a teacher, a real teacher, then a tradesman. In some places, like West Virginia, where there is one leading industry, he may only need to know one trade, but generally he will need to know several. In a large city a man should be able to conduct a large school in one craft. But we must provide for the smaller communities. Our teacher should know the two basic shops: bench wood work and blacksmithing, and should be able to guide pupils into the various corrolary trades, and country printing. To learn a trade requires about as much energy as to complete a course in a high school. Our teacher in a small town may be called upon to teach four or five trades. Now figure out what manner of man he must be. I know of only two or three men who could teach five trades. But a man could start with, say, two trades, then learn others as he teaches.

The advantages to the boy of my system of schools are many. First of all, he is at home while he works. He is under parental care as well as of the public school and the teacher. His parents may know how he gets along and how he spends his time. They may be able to help him much.

If he owns his shop, he will be concerned about its up-keep and the acquisition of new tools and additional

equipment. He will be more careful with what he has, and will use his spare change in making improvements instead of attending shows and games. It encourages thrift.

When he has completed his trade, he has his shop, his capital, his advertising, his patronage, and is actually set up in business. He does not have to hire out, though he may. He is the proprietor instead of employe. He does not have to strike—except when the iron is hot—though he may if he wants to.

One thing that my boys must learn in addition to producing marketable goods that the employe may not know is the gentle art of salesmanship. He may have the satisfaction of knowing that what he makes is as good as can be made, but if he cannot dispose of what he makes, he may experience an over-production. In my shops I cover management, meeting and treating with the public, making friends and extending trade, the use of publicity and the science of advertising.

I have met with much encouragement. The boys are eager to get in line for the work, parents are enthusiastic, public-spirited men see the logic, the naturalness and the advantages of the scheme, and the papers give free publicity. Mr. Hunsdon, director of industrial education in Texas, favors it. In a letter from him he said: "I am indeed very much interested in the experiment which you have been trying out in Galveston, and at the first opportunity I shall visit you and go over the situation carefully, and if it is possible to render you aid out of the Smith-Hughes federal and state funds, I shall be very glad to do so."

A College Girls' Fashion Show

Katherine Marshall, Oregon Agricultural College, Corvallis, Oregon.

DO college girls learn worth-while, practical things in home economics, or are they merely taught "new-fangled" ideas that are of no value to them when they have their own homes?

An affirmative answer to the first part of this question was given to the people in Portland, the metropolis of Oregon, March 23, by means of window displays of frocks designed and made by students at the Oregon Agricultural College in the leading Portland stores and a fashion show at the Multnomah Hotel during the dinner hour.

The many costumes and hats shown in the window displays and in the style show did not illustrate new fads that would pass in a short while, but well-made, good-looking, appropriate clothes for the average girl and woman to wear at all times. In addition to the customary work found on the dresses, many clever touches were added that distinguished them from the ordinary "home-made" gowns. These touches, which are usually sought in vain by the home dressmaker, were the results of work in the class in applied design at the college. It was evident that much thought had gone into the planning and designing of the garments, the combination of color, the proportion of parts, and the decoration.

The models for the style show were twelve college girls. They came down a broad marble stairway into the Arcadian gardens during the dinner hour and walked around among the guests. Correct clothes for school, for the street, for sport wear, for afternoon, and for evening were among those displayed.

The price of each dress, the name of the maker, and the name of the model were given in the dinner menus. Each girl appeared perfectly groomed. None of the home economics instructors assisted the manikins so there was no opportunity for a sudden change to make things "just right." They had to be just right in the first place—when they were made at the college.

The batik work displayed in several of the sport costumes in the form of broad bands decorating jackets and skirts and as the lining of one evening cloak received many admiring comments. The college girls have found it a simple matter to do this unusual and striking work for which many dollars are charged in the shops.

The cost of the garments ranged from $2.78 for a brown crepe school dress, to $31 for a rose velvet evening gown. Hats made in millinery classes were worn with some of the costumes.

The dinner at which the style show was given was cooked and served to 600 guests by seniors in home economics from the college. The hotel management was so pleased with the girls' work that the school of home eco-

WHITE GEORGETTE AFTERNOON FROCK—COST $20.
LAVENDER ORGANDY HAT—COST $3.50.

SPORT DRESSES MADE BY GIRLS AT THE OREGON AGRICULTURAL COLLEGE AS DISPLAYED AT A STYLE SHOW AT THE MULTNOMAH HOTEL IN PORTLAND, ORE.

nomics has been invited to make the dinner and style show an annual event.

The impression made by the entire affair can be summed up in a comment taken from one of the Portland papers: "Lovely girls and dresses of interesting and beautiful designs and color created a brilliant scene in the dining room where a nine-course dinner prepared by one group of the college girls was served effectively by another." Quoting from an editorial in the same paper on the style show and dinner, "It is a wonderful thing that the colleges are teaching the girl that the finest of all accomplishments, after all, is to be able to excel in doing those things that have to be done in a home, that home which is the chief stone in the foundation and the keystone in the arch of every nation."

RELATIVE DURABILITY OF NATIVE WOODS.

In response to numerous requests for information on the relative durability, or resistance to decay, of untreated woods, the U. S. Forest Products Laboratory, Madison, Wisconsin, has prepared the following table from the service records and information it has collected. There are not enough records in existence on some of the woods to be conclusive, and the durability figures given should be accepted only because they are based on the most complete service data anywhere obtainable, supplemented by observation and expert opinion from many sources. They are subject to correction whenever authentic service data show the necessity.

No attempt has been made to translate the relative durability given here in per cent into years of life, since the variety of climate, soil, and moisture conditions to which timbers might be exposed would make such data worthless. Individual timbers of the same species may differ considerably in durability, too, according to the amount of heartwood and sapwood they contain and to their state of preservation when they are placed in service. Under any given set of conditions, however, the average service life of timbers of the different species will probably vary in proportion to the percentages given.

Black locust and osage orange are the most durable of the native woods. When exposed to conditions which favor decay they will probably last almost twice as long as white oak, and from three to four times as long as red oak. Bald cypress, redwood, catalpa, and most of the cedars are also highly durable species. Douglas fir, longleaf pine, the white pines, and western larch average only a little less durable than white oak. Hemlock, the true firs, and loblolly, lodgepole, and western yellow pines fall considerably lower. The sapwood of practically all species has very low durability.

RELATIVE DURABILITY (RESISTANCE TO DECAY) OF UNTREATED WOODS.

Durability of commercial white oak taken as 100 per cent.

Conifers.	
Cedar, eastern red (juniper)	150-200
Cedar, southern white	80-100
Cedar, other species	125-175
Cypress, bald	125-175
Douglas fir (dense)	75-100
Douglas fir (ave. mill run)	75-85
Fir ,the true firs)	25-35
Hemlock	35-55
Larch, western	75-85
Pine, jack	35-45
Pine, longleaf, slash (Cuban)	75-100
Pine, Norway	45-60
Pine, pitch, sugar	45-55
Pine, shortleaf	60-80
Pine, So. yellow (dense)	80-100
Pine, western white	65-80
Pine, white	70-90
Pine, western yellow, pond, loblolly, lodgepole	35-50
Redwood	125-175
Spruce, Engelmann, red, Sitka, white	35-50
Tamarack	75-85
Yew, Pacific (western)	170+

Hardwoods.			
Ash	40-55	Hickory	40-55
Aspen	25-35	Locust, black	150-250
Basswood	30-40	Locust, honey	80-100
Beech	40-50	Magnolia, evergreen	40-50
Birch	35-50	Maple	40-50
Butternut	50-70	Mulberry, red	150-200
Catalpa	125-175	Oaks, red oak group	40-55
Chestnut	100-120	Oaks, white oak group	40-55
Cottonwood	30-40	Oak, chestnut	70-90
Elder, pale	25-35	Osage orange	200-300
Elm, cork (rock), slippery	65-75	Poplar, yellow	40-55
Elm, white	50-70	Sycamore	35-45
Gum, black, cotton (tupelo)	30-50	Walnut, black	100-120
Gum, red	65-75		
Willow	30-40		

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

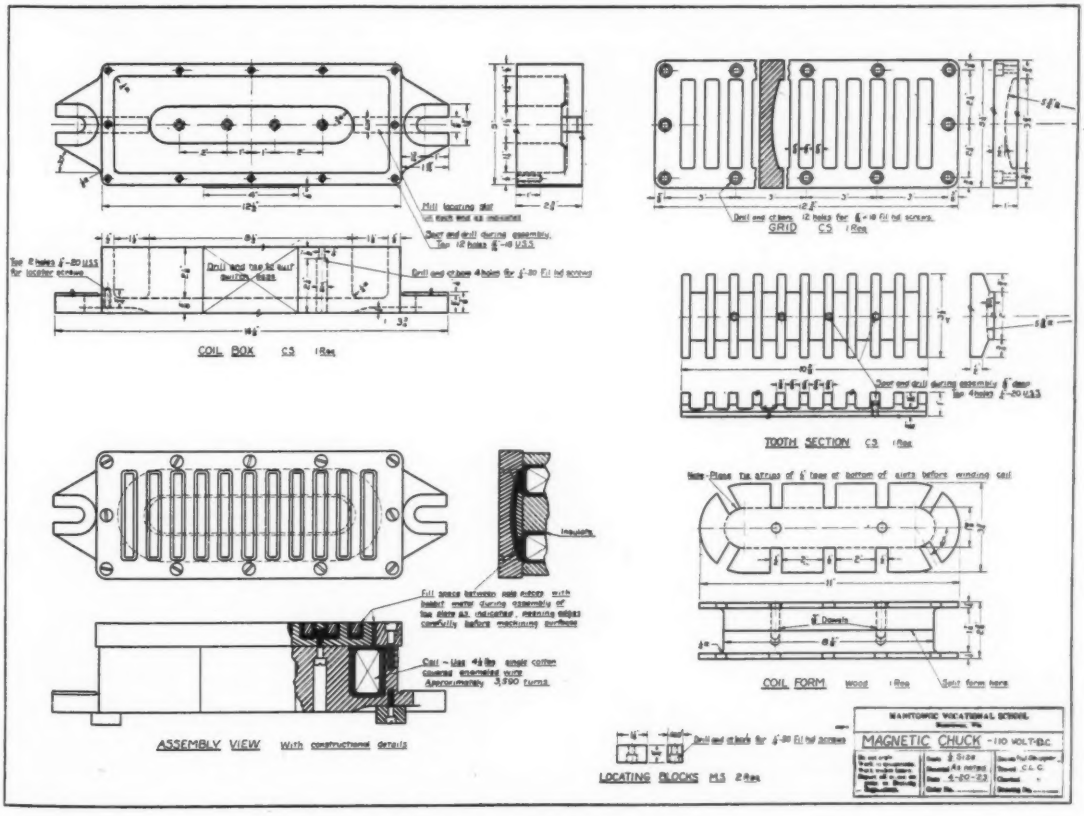
MAGNETIC CHUCK.

Chas. H. Conroy, Manitowoc Vocational School Drafting Department.

At the beginning of the present year our machine-shop department had expressed the desire for a magnetic chuck as an attachment to its grinder, a Cincinnati cutter grinder. After finding the price somewhat more than we cared to invest we considered the idea of building one ourselves. The drafting department was given instructions finally, to design a suitable chuck for our uses and one that could be easily built by the student. The accompanying drawing will give a clear idea of the project as it left the drafting room.

The design was completed by one of the advanced drafting students, a boy between 18 and 19 years of age. He was first given references to look up in electrical and physics books until he had been taught the fundamentals of magnetism, magnetic circuits, and related knowledge. He was then shown how to trace the magnetic chuck back to its early adaptions, and this material was located partly at the public library and partly through the "American Machinist," in which was published an interesting history of the magnetic chuck and the early efforts and designs of Walker and others. After going through this material, measurements of the machine table were taken and a general idea of the job was sketched. Several catalogs of chuck manufacturers were obtained and studied with some advantage. Our job was to simplify and yet get a chuck to produce good results. We omitted the attempt to make the chuck absolutely moisture-proof as this required some rather difficult operations for the students to master, tongue-and-groove joints between the base and top plate, etc. Our grinding will be practically all dry, so this simplified matters considerably. I followed the work closely going into the study of chucks more in detail than before to enable checking and correcting the boy's results. The drawings were finally completed, pencil tracings made and blueprints furnished to the pattern shop where patterns and the coil form were made. These patterns were shipped to a steel foundry, the use of a steel casting being much more desirable on account of its higher permeability and strength.

I might suggest here a few pointers in machining and assembling this project. Babbit or type metal may be used for filling the spaces between the grid and tooth section, or any low melting alloy that doesn't shrink upon cooling. The grid and tooth section may be machined on the bottom first to allow it to set properly on a flat plate while pouring the babbit. Adjust the relative positions of both pieces to allow the 1/8" clearance between slots and teeth as indicated in assembled top view. Gently heat both pieces somewhat with a blow torch to allow the babbit



DETAILS OF A MAGNETIC CHUCK.

to flow freely and fill all spaces completely. Rough down the top of this assembled plate and then finish both sides to the required dimensions. The coil box may now be machined with the exception of drilling and tapping holes. Now clamp the top plate to the box, being careful to line it up evenly. The twelve holes may now be located and drilled with a tap drill and then the plate removed for redrilling to 5/16" and counterboring to fit 5/16" fillister head screws. Tap the holes in the coil box and then fasten the top plate to the box securely with screws. Lay out the four holes that are drilled from the bottom, being sure that the tap drill, after reaching the top plate, will penetrate a tooth of the tooth section as indicated on the side view of the assembly drawing. Then drill and tap as in the first case. These four screws keep the tooth section and coil box core in perfect contact.

The coil form will enable winding and taping the coil before setting it into the box. The wire size and number of turns shown will give the best results for this particular case and are figured out for 110 volts D. C., the current furnished by our motor generator set in the auto department for storage battery charging (alternating current cannot be used). After the coil is wound, tape it and be sure leads are left to run through the box and to attach to the switch outside. Insulate may now be added, care being taken to distribute it, and place the coil in position shown, suspended in the compound.

A simple knife switch is sufficient. A double throw switch is more desirable, as this allows the reversal of the current through the coil, for just an instant, which eliminates most of any residual mgnetism left in the chuck.

After the chuck is finished and assembled, and locating blocks are attached, it may be given a coat of black engine paint or filled and varnished, with the exception of the base and top. When the chuck is bolted down, then a finish grinding out should be taken with the grinding wheel.

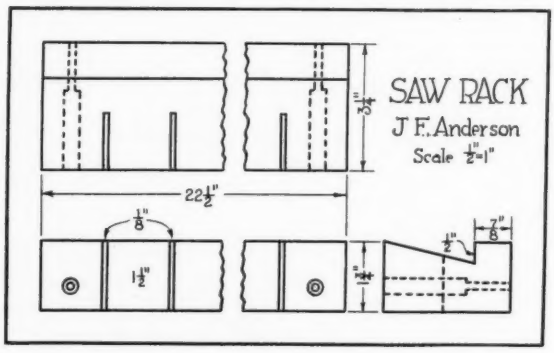
Although this attachment would hardly be a practical project for a shop not having direct current at its disposal, it will prove very valuable in many instances in one that has. Its construction simple as it is, both in patterns and machine operations, involves many important points in the processes of machining and assembling. It also brings out the fundamentals of magnetism and has proved to be a very interesting project in our school when all actual work was done by students.

SAW RACK.

J. F. Anderson, Director of Manual Training, Brookings, South Dakota.

During my experience as a teacher of woodwork I have seen and used many devices for holding hand saws which, however, have not been as satisfactory as the one I am now using. The accompanying drawing and picture show the construction.

There are a number of desirable features about this rack, noticeably absent in many others. The saws are grouped in a minimum of space, not usually utilized for any other purpose. It is possible to distinguish a rip from a cross cut without first having to remove the saw from the rack. The rack accommodates any saw from a keyhole to a thirty-inch hand saw and either a straight or skewback with equal facility. The length of the rack can be varied, according to the number of saws to be accommodated.

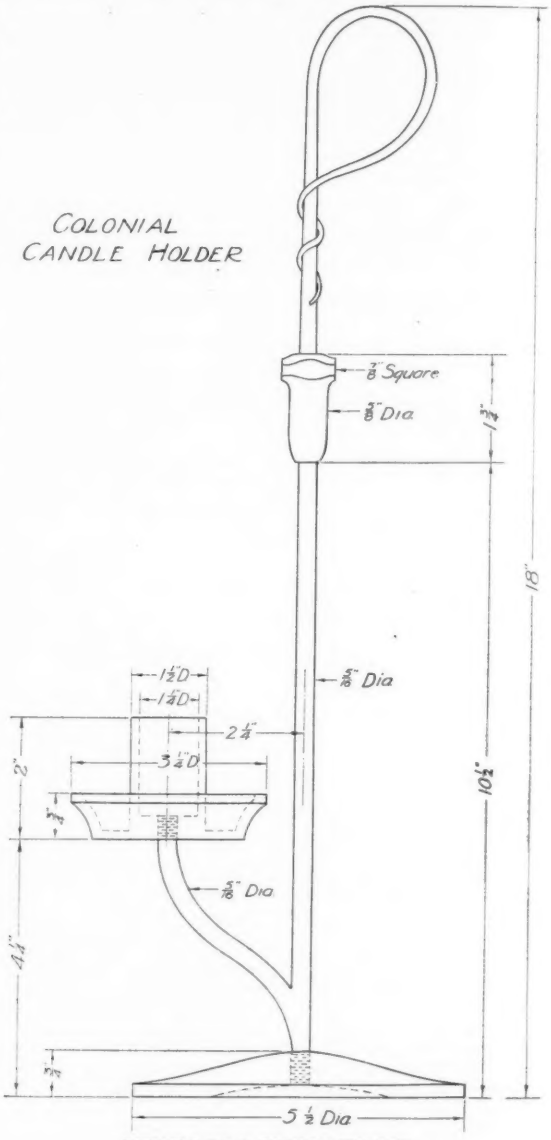


The rack was originally made of a maple two by four and cut to length, then the angle cut out on the saw bench and the saw holes made with one cut of the cross cut machine saw. The screws had to be set in a short distance as the drawing shows. I have the saws placed on the end of the supply cabinet in the tool room, where there is no danger of anyone rubbing against the teeth.

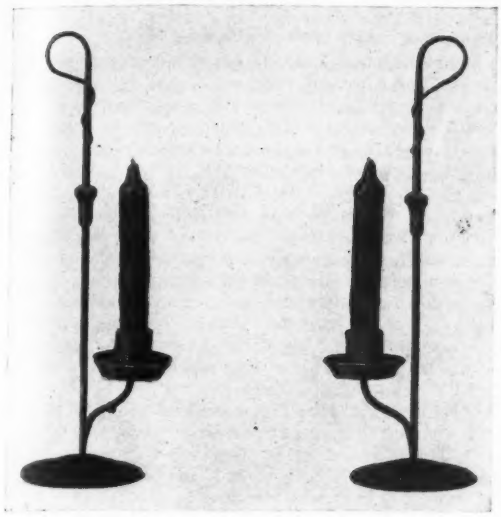
COLONIAL CANDLE HOLDERS.

H. J. Wieland, Department of Pattern Making and Foundry Practice, Vocational High School, Virginia, Minn.

The colonial candle-holder, shown in the photos and drawings, can be made successfully by a ninth grade student. It is an interesting problem and takes in pattern making, foundry and forge work and a little machine work. The aluminum base and cup can be made of black sheet iron, formed and shaped in about the same way as



DETAILS OF A CANDLE HOLDER.



A PAIR OF COMPLETED CANDLE HOLDERS.

the castings are, making it a forge shop problem only.

Instructions for Making.

Base—A pattern was made the size and shape shown in the drawing. This was cast in aluminum and threaded to receive the stem.

Cup—This was cast of aluminum, the opening can be made to suit the diameter of the candle. Drill a hole in the bottom and thread same to receive stem arm.

Stem Ornament—This can be turned of wood or metal. The size of the hole should be tight so that it will stay in place on the stem. A hole can be drilled through the ornament and stem and a small pin inserted to hold it in place.

Stem and Arm—The stem and arm are welded together. The whip like top is tapered down to 1/16" diameter. It is heated and twisted as shown in the drawing.

Finish—The entire piece can be finished in full black, or it can be painted to suit in color or bronze.

FRYING PAN.

H. J. Wieland, Virginia, Minn.

The frying pan here described is known in our foundry as the two egg size. It is a practical problem, very interesting to make and a very useful article in any home. It is made of cast aluminum metal, which is not hard to clean up, and one which will retain its heat a long while.

Directions for Making Pattern—The pan part is glued up of five pieces of pine crossed grain so that it will not warp. This stock after it is dry, is glued to a wood face plate. It is well to make a template of wood, the exact shape of the inside and outside, this will save all caliper and guess work in getting the metal of even thickness. After it is turned, it should be given a coat of shellac and cut off of the face plate. Next the outside should be chalked and the spout fitted. Glue this in place, after drying the shape can be worked out with a gouge and chisel. The handle stem can be turned, next fitted, glued and nailed to the pan. Give the entire pattern a coat of

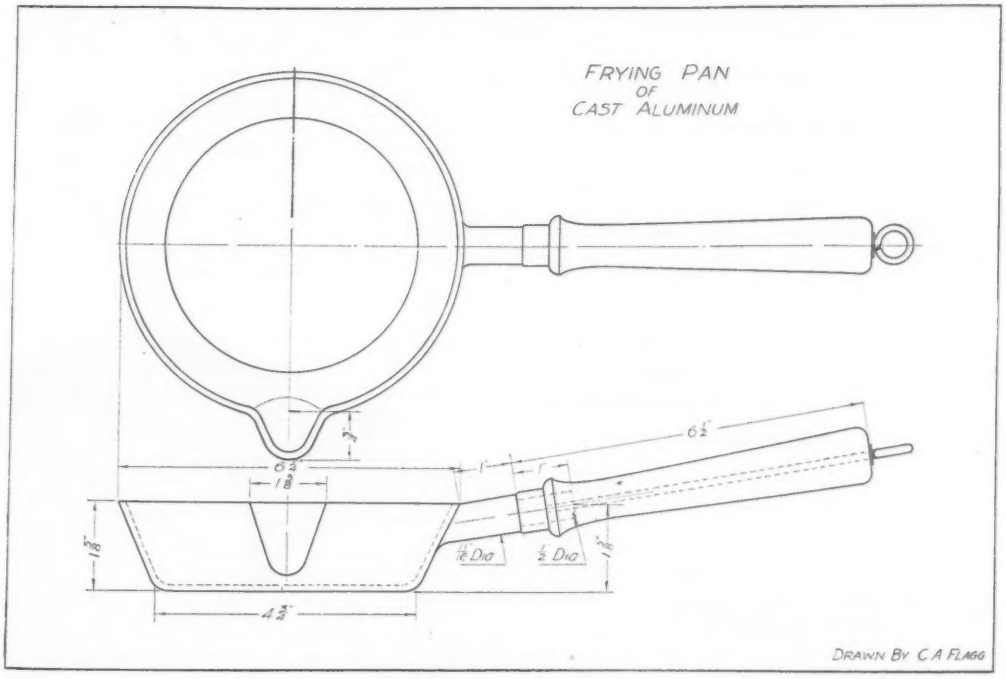
A COMPLETED FRYING PAN.

shellac; rub down and apply wax fillets in corners, and finish up ready for moulding.

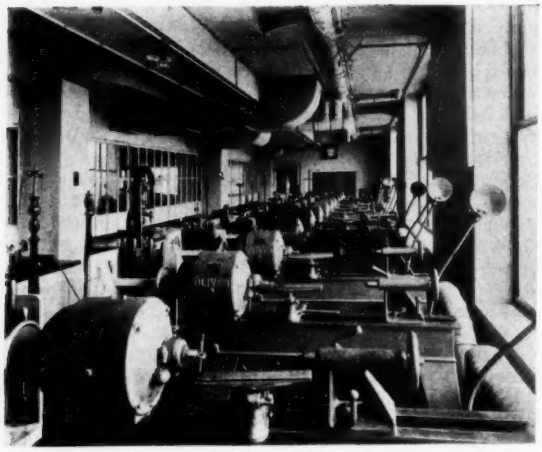
Moulding—A 12"x16" snap flash 3" drag, 3" cope is suitable for this pattern. The inside of the pan should be filled with sand or bedded in. This is done so as to avoid breaking of the pattern when ramming up. The gates and sprues should be made as large as possible so that the metal will not cool before the mould fills up.

Metal Pattern—A wood pattern for this pan would not last very long in moist sand, so it would be well to take the first good casting and file and finish it up for a metal pattern.

Fnishing the Pan—The outside of the pan can be left just as it comes from the mould, only the gate marks can



DETAILS OF FRYING PAN.



WOOD SHOP, VOCATIONAL HIGH SCHOOL, VIRGINIA, MINN.

be taken off. For finishing the inside, a block of wood is turned to fit snug into the inside. This block is coated with glue and dipped into coarse emery. After this is dry, it is placed in the lathe and used as a polishing wheel for cleaning up the inside. The spout can be cleaned by hand with a little emery cloth. Drill and tap the handle stem to take a 3/16" rod.

Handle—The handle is turned of birch with a suitable brass ferrule of the same diameter as the handle stem. Bore a 3/16" hole through the handle and polish with black shellac.

Bale or Hook—Thread end of bale for about 1", cut off to size and turn a 1" eye on end. Slip this rod through wood handle. Place washer on end and tighten up. This makes a very desirable handle which can be tightened up after the wood dries up or can be taken apart in case the handle burns off.

ELECTRIC TOASTER.

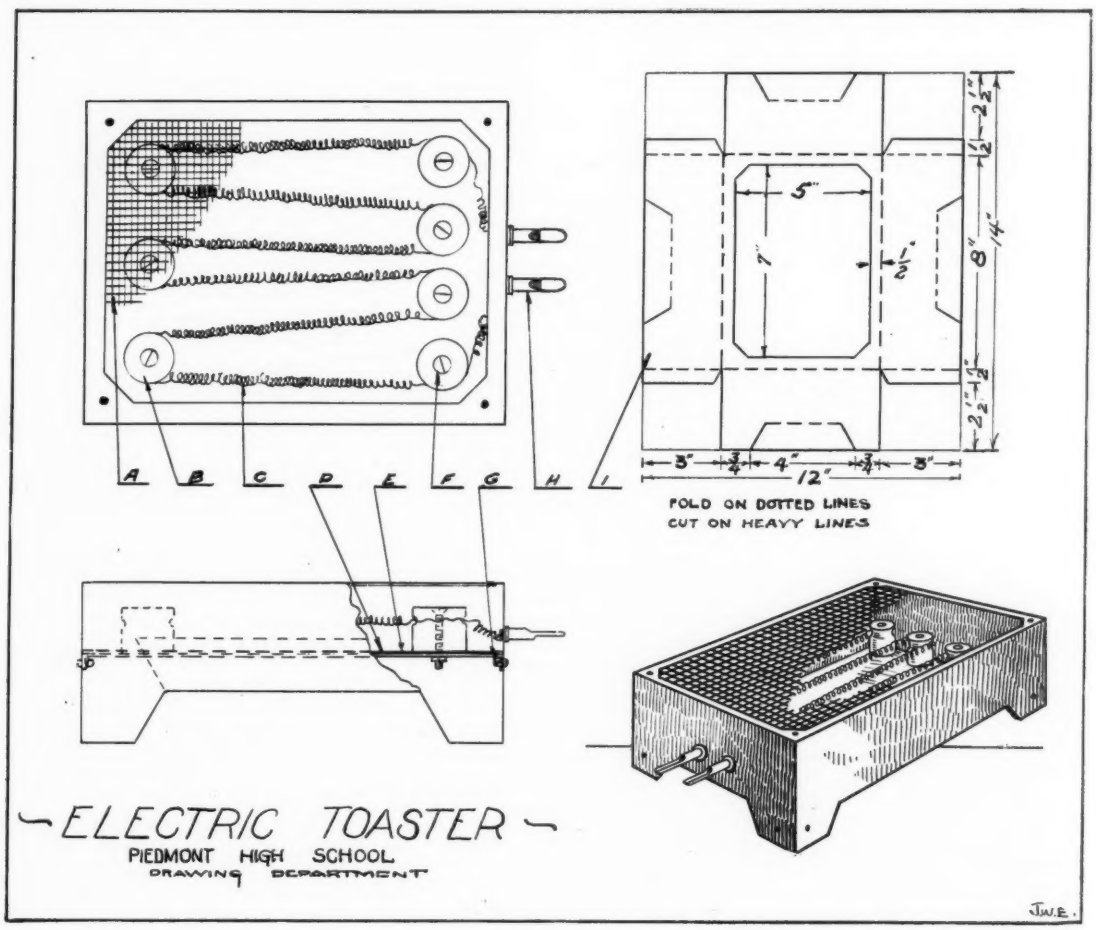
F. W. Barnett, Piedmont, Calif.

Some years ago the INDUSTRIAL ARTS MAGAZINE published the drawing and description of an electric toaster, the frame being made of wood. A number of these have been made in our shop and, although very satisfactory, we have had trouble with the bottoms burning out. As we have sheet metal and electrical departments in our household-mechanics shop this same toaster makes a fine problem when made of sheet metal.

The drawing shows a developed view of the metal frame. After cutting out the center bend into shape and rivet. Hardware cloth is used for the top and is also riveted in place. The bottom is made of sheet iron, covered with asbestos, and fastened in the frame with stove bolts.

Materials required are as follows:

A	¼" Hardware cloth, 6"x8".
B	7 ¾"x1" Porcelain knobs.
C	19 ft. of No. 21 Climax wire.
D	Asbestos paper, 6"x8".
E	No. 26 Galvanized iron, 6"x9".
F	7 $\frac{3}{16}$"x1" Round head stove bolts.
G	2 $\frac{3}{16}$"x¼" Round head stove bolts
H	2 Terminals.
I	No. 26 Galvanized iron, 12"x14".



A WINDMILL WEATHER VANE.

A. F. Bick, Milwaukee, Wis.

All the pieces for the mill, except the blades, doors, and windows, may be cut from cypress boards ½x4x38 and ½x4x29, as illustrated. The blades, etc., are ⅛ inch thick.

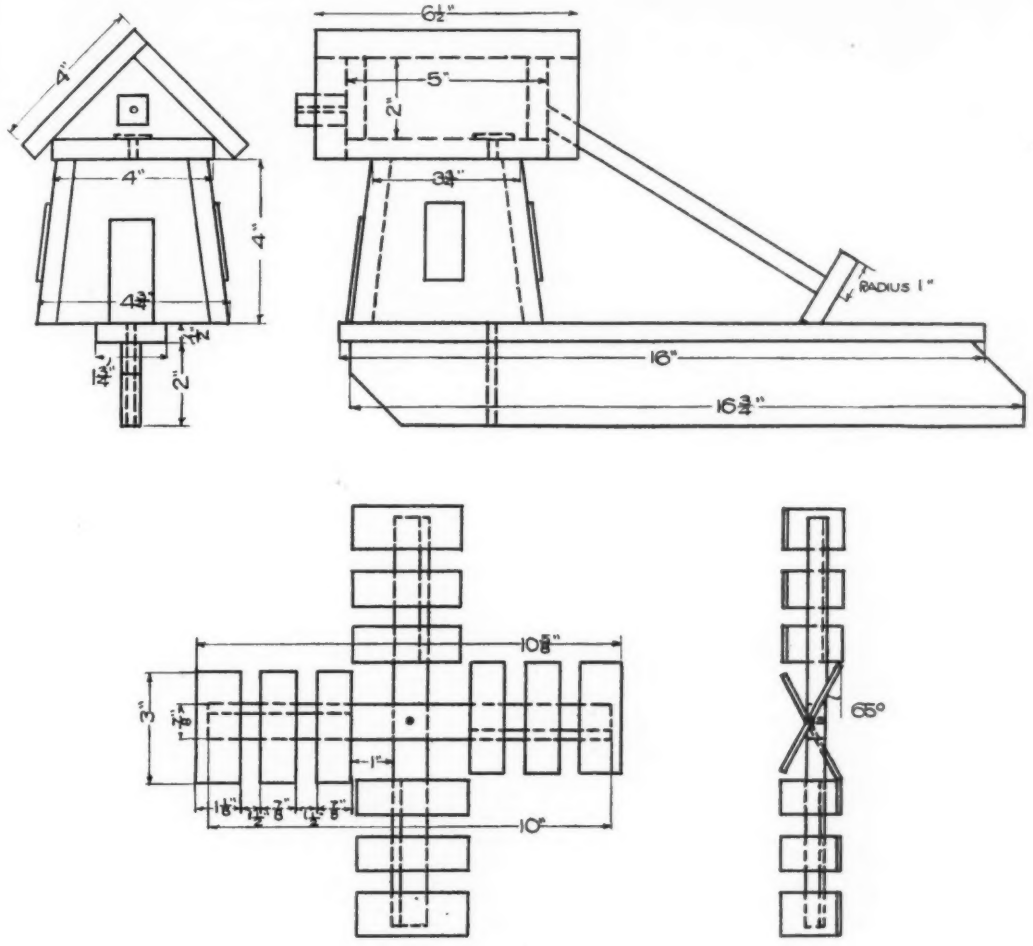
A small brass tube is inserted in the center of the wings, or whips, for a bushing. A flat piece of iron is fastened inside the mill house, as a bearing for the iron rod which passes through the base, and on which the mill turns in the wind.

The roof, doors, windows, and the large blades, are painted green. The smaller blades, window frames and sash, and door frames, are white. The remaining surfaces are varnished.

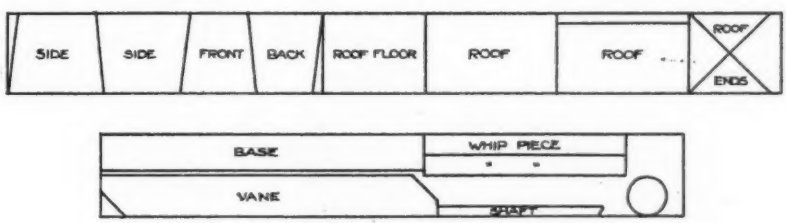
COMMERCIAL EXPERIENCE IN SCHOOL CARPENTRY.

Paul R. Grabske, Nogales, Arizona.

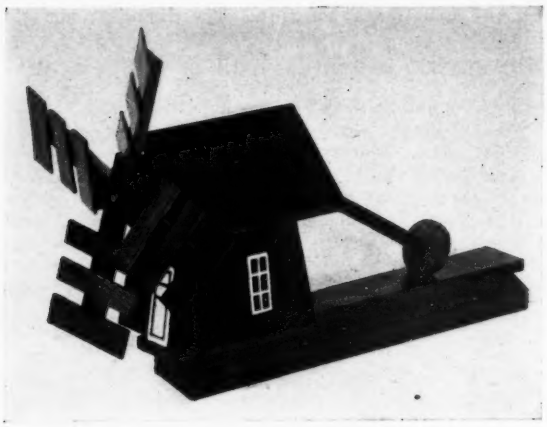
Last spring I was able to offer my advanced high school students in woodwork an excellent opportunity to acquire commercial experience. The work was done outside of school hours and paid for at the rate of twenty cents an hour. It is understood, of course, that no student so employed, neglected either the work to be done in his regular woodwork class or that of any other class. Saturday afternoon proved to be popular as pay day. Boys were



WINDMILL WEATHER VANE
SCALE ¼ = 1 INCH



DETAILS OF A WINDMILL WEATHER VANE.

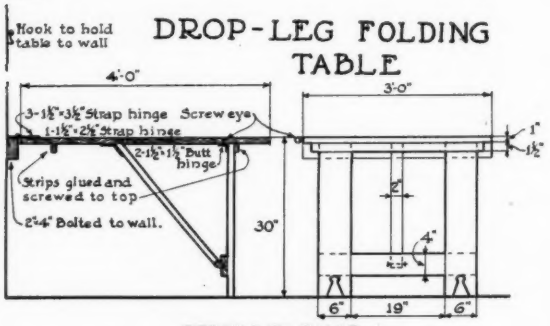


THE COMPLETED WEATHER VANE.

retained on the basis of first-class work. The results were excellent.

A new school cafeteria was to be installed in the basement. The work at hand was to construct:

1. Ten drop-leg dining tables hung from a concrete wall.
2. Two serving tables with a rail above for sliding trays, and a shelf below for extra dishes.
3. Three nine-foot dining tables to seat nine people each.



DETAILS OF TABLE.

The drop-leg tables presented the most difficult problem; I shall describe their construction with a view to assisting anyone confronted with a similar problem. These tables were to be fastened flat against a concrete wall when not in use. As the seating capacity was to be five persons, tops were made 3′ 0″ wide and 4′ 0″ long. Oregon pine was used with a light oak stain, and three coats of orange shellac, which made an expensive but durable finish. One end of the table was fastened with two strong strap hinges to a 2″x4″ bolted to the wall: the other end was supported by a drop-leg which folded up when not in use; in order to keep this leg from collapsing and brace it when down, we used a 1″x2″ hinged to the adjoining under side of the table. Two screw eyes were set 2½″ apart in the center of the lower rail and a ¼″ hole bored through the 1″x2″ edgewise at a point ¾″ from the end. A 20 D. nail cut in two was used as a pin to lock this brace by slipping it through the two screw-eyes mentioned above. A separate screw-eye was placed in a convenient place, under the table, in which to slip the loose pin when not in use. A small hook and eye was used on one edge of the table to hook the said table to the wall when folded.

These tables, the serving tables and the dining tables were well made and the work proved to be popular with the boys; accordingly I have been able to use the same plan for general repair and construction work about the school. We have built the following:

1. Seventy-five wooden guards for small trees on the playground.
2. Put ten new window panes in old frames.
3. Put up four additional heavy slate blackboards in a classroom.
4. Refinished four ink-stained, flat-top maple tables used in the commercial department.
5. Refinished scratched and ink-stained tops of two quarter-oak library tables 9′x3′.
6. Removed center panel from door of cafeteria store room and placed screening in its place for providing ventilation.

Thus able high-school students in woodwork have received commercial experience, under supervision, before reaching college. I hope to have some work of this nature every year for advanced students as the results seem worth while.

WOODWORK PUZZLES.

E. M. Wyatt, Dallas, Tex.

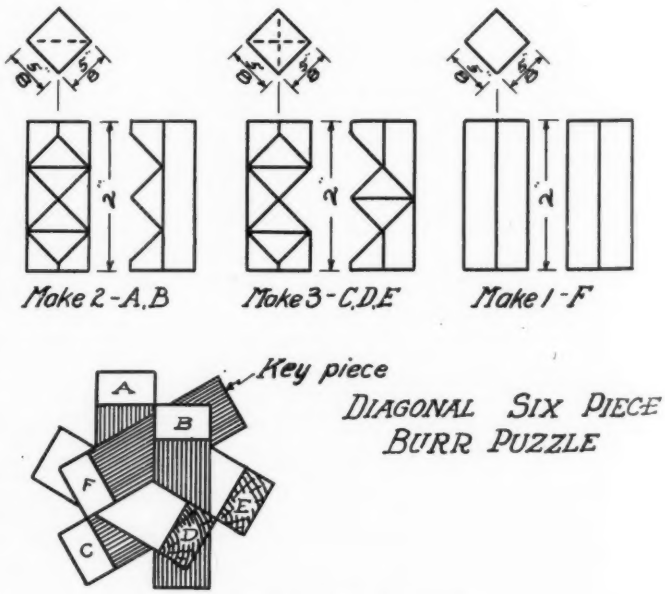
Puzzles have a fascination for most persons. It is a fascination akin to that which leads the inventor, discoverer, and scientist on and on in their investigations. The solving of a puzzle is a game of solitaire that every good fellow enjoys.

It is a wise manual training teacher who selects projects for his students which have appeals in addition to the love of making. There are a great number of fine woodwork problems to be found in the realm of puzzles. They provide a variety in required skill and construction processes and often appeal intensely to boys who show but an indifferent interest in the more staple manual training exercise pieces.

Diagonal Six-Piece Burr Puzzle.

Aside from squaring up, the construction of this is more a knife problem than one in the use of the more ordinary woodworking tools. This is because the most practical way of laying out and making the cuts in the various pieces is by the cut-and-try method. If the pieces were made two or three times, the sizes indicated in the detail

[1]The author of this paper is interested to receive sketches and descriptions of old and new and especially of original puzzles in wood. Each puzzle received will be paid for.



DETAILS OF WOOD BLOCK PUZZLE.

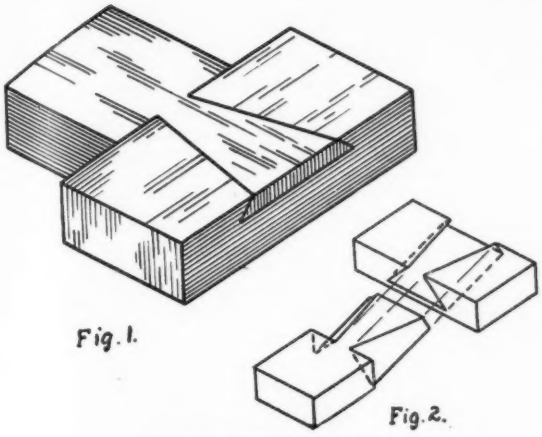


Fig. 1.

Fig. 2.

DOUBLE DOVETAIL JOINT.

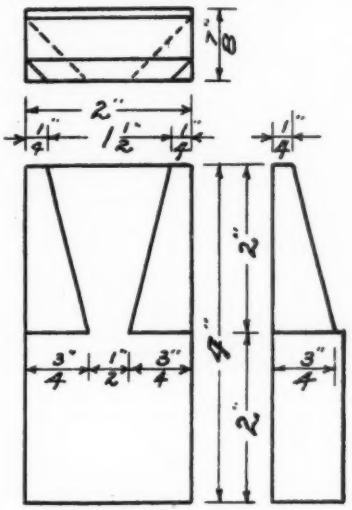


Fig. 3

drawings the cuts might be quite carefully laid out with a bevel and sawed with a bench saw.

A common variation from the design given is to round the pieces off, after assembling, so as to form a ball. This fits in well with the whittling method of construction.

A study of the assembly will give a sufficient key to the method of assembling. F is the key piece which is pushed into place last of all. Some craftsmen make this key piece slightly tapered so that when it is pushed into place, small end first, it tightens up the assembly.

The Double (?) Dovetail.

The isometric assembly of this piece, Fig. 1, looks like an impossible piece of construction. It is easy to dismiss the drawing that way but it is not so easy to dispose of a couple pieces of wood dovetailed together that way. The tongue can neither be pulled out backwards nor upwards, as it is larger at the front and bottom than the openings in the other piece through which it must pass! Yet many a manual training student in the old "joint" manual training days made these very joints as part of his manual training course.

The pieces really form a simple dovetail but are set at an angle with the faces of the wood and only looks like a second dovetail on the surface. The tongue is slid in and up at an angle, and not straight in as one naturally supposes. Fig. 2.

The piece is most effective when made of contrasting, colored woods, as this proves it to be a real joint. It should be glued, filled and varnished so that the joint cannot be taken apart or its secret detected by careful inspection. If well made, it will stamp the maker as a real craftsman in the eyes of all workers in wood.

DYNAMITE CAP BOX.

O. R. Johnson, Wausaukee, High School, Wausaukee, Wis.

In northern Wisconsin where much cut-over land is being cleared, a dynamite cap box makes an interesting problem for any country boy. While stump pullers are frequently used, the most efficient means of ridding a field of pine and fir stumps is dynamite.

The dynamite cap box here shown is made of a soft wood and measures 2½x9⅝x2¾ inches. It contains space for 100 standard caps. The felt cushions in the cover and base make it possible to handle the box quite roughly without danger of an explosion.

While this problem is of doubtful value in any district except one where land is cleared, it does point to the possibility of adapting manual training problems to local needs.

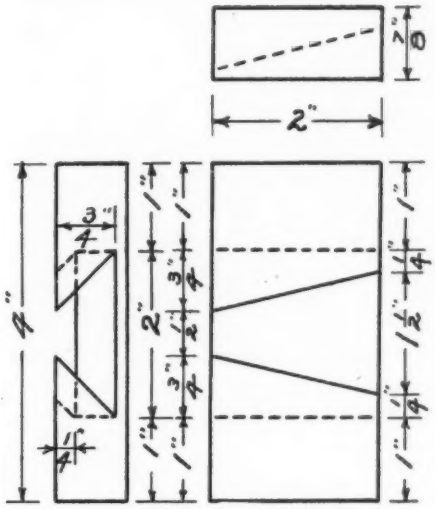
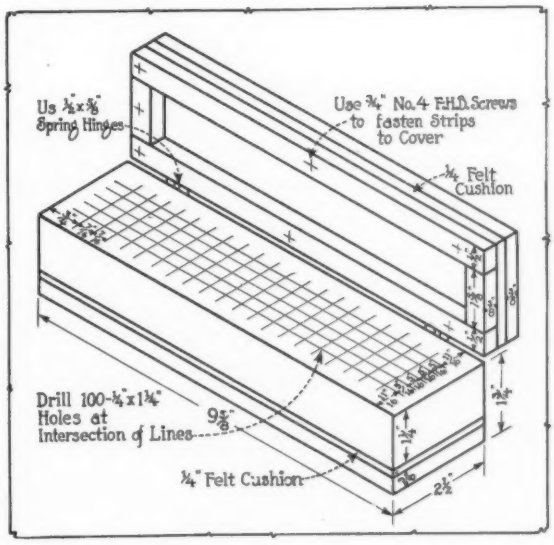


Fig. 4



MAKE SCHOOL FURNITURE IN CANTON.

Making school furniture for new school buildings is the task of Canton High school boys. No sooner had the school bell quit ringing at McKinley high school, Canton, than the whistles began blowing and the school building was converted from a seat of learning into a busy industrial center. And the Canton board of education at the end of the summer vacation will have saved more than $3,000 in schoolroom equipment.

The boys of the cabinet-making department of the McKinley high school have been given the contract to make school desks, tables and cabinets for the new schoolrooms and this summer will speed up the work to such an extent that the board won't find it necessary to buy any movable furniture for schoolrooms, with the exception of pupils' desks.

HIGH SCHOOL BOYS AT WORK IN CABINET MAKING DEPARTMENT, McKINLEY HIGH SCHOOL, MAKING SCHOOL BUILDING EQUIPMENT.

C. E. Littell, head of the industrial department is general superintendent of the factory. Instead of observing school hours the boys will have regular factory hours and will receive wages ranging from 25 to 40 cents an hour. During the school term the boys work in the cabinet-making department as a part of their school work but in the summer they find it an excellent means of making money.

The school board has issued requisitions for approximately $10,000 worth of furniture and on the contract with the boys of McKinley High school more than $3,000 will be saved, it is estimated.

During the summer months more than 250 desks for teachers are being made. Had the board been compelled to purchase these from outside sources the cost would have been $65 apiece. The boys make large roll top desks as well as the flat types. Requisitions which are being filled this summer include forty drawing tables; eighteen general science tables, fourteen domestic science tables, twelve sewing tables, thirty-six bookkeeping tables, and forty desks.

In addition to the work outlined the boys expect to find time to make special cabinets for the science and chemistry rooms at McKinley High school and about fourteen bulletin boards.

The McKinley high school has excellent facilities for furniture making. One long room is devoted to machines and another is used for assembling cabinet work. Other rooms are used for the various stages of the finishing. Every article of furniture after it is dressed down, received a coat of filler, two coats of shellac and three coats of varnish, each of which is thoroughly dried and rubbed down. The result is that the desks have a finish superior to the ordinary factory-made articles.

Incidentally, the boys after they have finished a summer's work under the guidance of experienced cabinet-makers, are equipped to take positions as skilled cabinet-makers.

THE PARENT AND THE SCHOOLS.

H. E. Stone, Dean of Men, West Virginia University.

An Oxford professor of higher mathematics once thanked God that he had never taught his students anything of which they could make even the slightest use. His theory of education was the "culture theory" carried to an extreme and highly flavored with "mental discipline" doctrine.

There are, in enlightened communities, few who start the new year with this attitude toward education. The parent of today desires for his children a reasonable amount of so-called cultural education. He is also interested in seeing them develop the power to think straight and work effectively.

EXHIBIT OF SCHOOL-MADE SCHOOL DESKS, McKINLEY HIGH SCHOOL, CANTON, OHIO.

He is not satisfied to have them become "walking dictionaries of facts." He is not content with an education that gives a monopolistic position to dead languages, nor would he discard these entirely. He wants his son or daughter to learn to work with other boys and girls. He sees in the pre-vocational work of the junior high school an effort to develop this power which is at the basis of success in every occupation. He appreciates the fact that educationally there is something in printing, wood-working, sheet-metal and electrical work beyond that which the mere words imply.

He knows that his boy is different from every other boy. He asks that the schools recognize this difference in interests, aptitudes, and capacities.

As to the life work his boy shall enter, his attitude is one of humility. Modern life is so complex and his time is so limited. He demands help in the educational and vocational guidance of his offspring.

It is in response to these demands of the collective community parent that public schools have pre-vocational and vocational courses, junior high schools, educational and vocational guidance, and free night school courses. It is in response to the same felt need that committees on vocational guidance, deans of men, deans of women, orientation courses, class officers and advisers, etc., have become common in American universities.

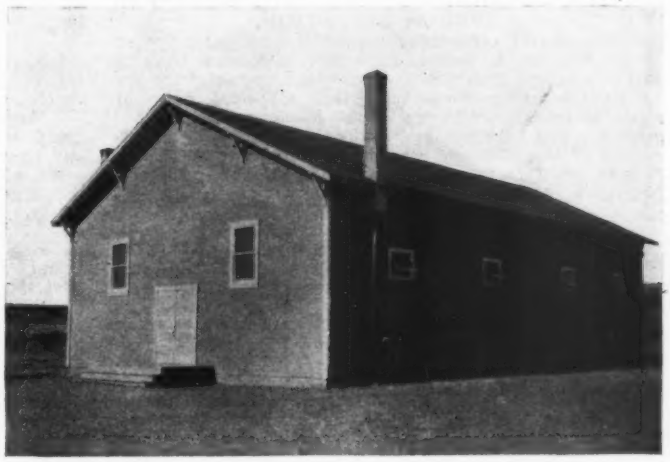
The parent of 1923 wants to know the truth as to what is the right kind of education for his particular children, not what tradition has hall-marked as suitable for the average child. He knows that research workers have long since ceased to talk about the average hog and the average cow. He realizes that a draught horse and a race horse require different treatment. He thinks his own flesh and blood entitled to equally intelligent consideration.

The parent of 1923 does not want to waste money—even for education. He asks this question, however: "Which is better—to provide the right kind of schooling at the necessary additional cost over that of an antiquated system, or to extend this additional sum for hospitals, asylums, and jails where we may hide our social and educational mistakes?"

A HIGH SCHOOL GYMNASIUM.

The high school at Holbrook, Ariz., enjoys the use of a gymnasium building planned by the instructor of manual training, and erected in the fall of 1921 by the members of the manual training classes.

In the fall of 1921 the need for a gymnasium building became very pressing and the manual training department offered to erect the building provided the board of education would furnish the money for the lumber and other necessary materials. The funds at the disposal of the board of education amounted to only $1,500, not a large sum with which to erect a building measuring 40x70 feet.



GYMNASIUM BUILDING AT HOLBROOK, ARIZONA, ERECTED BY MANUAL ARTS CLASS UNDER DIRECTION OF MR. R. C. SKAGGS.

The work of constructing the building was begun on September 5th and the entire building was completed on November 11th. The building is set on concrete blocks and has a footing of 16" on which has been placed a 6" wall of concrete one foot high. The floor joists are 2"x6" Oregon pine, spaced 16" on center supported by beams of Oregon pine set 6' 6" on center and supported by concrete blocks spaced 5' apart. The soil on which the building stands is extremely hard on the surface but becomes softer the deeper it is dug. For that reason the footings and the concrete blocks were set immediately on top of the ground. There is no frost and consequently no danger of cracking the foundation.

The studs of the building are of 2"x6" Oregon pine, set 24" on center and the roof is carried on trusses made by 2"x6" material. The entire exterior was clap-boarded and the interior was left with the frame work in plain view. The boys erected a movable stage 20'x30' for school exhibitions, etc.

The heating is done by means of stoves and the equipment is of the simplest. The entire work on the building up to the painting was done by the members of the manual training class. Mr. R. C. Skaggs acted as director of the work. He prepared the plans and actively led in the construction.

GYMNASIUM BUILDING UNDER CONSTRUCTION BY MANUAL TRAINING CLASS, HOLBROOK, ARIZ.

NEW BOOKS.

Elementary Printing.

By Frank P. Rich. Cloth, loose leaf, 54 pages. Published by the author at the Tyler Street Prevocational School, Boston.

This book presents in loose leaf form a series of introductory lessons on correct type, composition and suggests a series of jobs which can be used in teaching straight composition, the setting of verse, the setting of business letters, title pages, etc. In addition to the jobs and the fundamental lessons there is considerable supplementary material and technical information on the fundamental principles in printing and composition. The lessons have the ear marks of successful teaching experience and the work is splendidly adapted to part time classes where large numbers of boys must be handled by one teacher.

Blackboard Drawing.

By Morris Greenberg. Boards, octavo, 36 pages. Price 50 cents. Binney & Smith Co., New York, N. Y.

This book suggests a series of valuable devices which the teacher can use for making the blackboard an effective means in driving home special lessons in the various school subjects, in promoting class spirit and discipline, and in teaching many important lessons which are not ordinarily included in the formal curriculum. The book suggests diagrams and illustrations for teaching difficult facts in geography, for teaching such troublesome problems as fractions, weights and measures, etc., in arithmetic, for teaching the elements of nature study and science, for promoting cleanliness and good health, fire prevention, safety, music, etc. The author is an art teacher of long experience and every page reflects his long and ingenious experience in using the blackboard.

New Year Greetings.

By James Parton Haney. Price $2. Published by The School Art League, 599 Fifth Ave., New York, N. Y.

Many of the friends of Dr. James Parton Haney do not know that his accomplishments included the writing of fine inspirational verse.

New Year Greetings is a compilation of his greetings to personal friends during the later years of his life. The book is a neat volume of verses that reflect the inspiration and hope of accomplishment so characteristic of the author.

These verses help the reader to "Go Singing Up The Hill" in the vigorous, capable way in which Dr. Haney helped so many of his school friends and pupils during his long service in industrial-art education.

Not only the personal friends of Dr. Haney but all who share with him the "urge of beauty," will find a great privilege and inspiration in these delightful expressions of a soul consecrated to service through the teaching of the arts.

The profits from the sale of this publication will form part of the James Parton Haney Memorial Scholarship Endowment.

Kiln Drying Handbook. By Rolf Thelen, Bulletin No. 1136, U. S. Department of Agriculture, Washington, D. C. This valuable bulletin has been issued in behalf of the Forest Products Laboratory, Madison, Wis., and copies are available from the laboratory without charge. The preventable loss of lumber through improper seasoning is estimated at $50,000,000 annually. If the careful scientific methods described in this handbook were followed practically this entire loss would be obviated. The material is the result of carefully recorded scientific tests under working conditions which can be approximated in any commercial dry kiln. Copies of the book should be in the hands of teachers.

A SYNOPSIS OF INDUSTRIAL ARTS WORK FOR A SPECIAL SITUATION.

The present synopsis of industrial arts was prepared by Mr. Charles A. Kunou, supervisor of manual training at Los Angeles, Calif., in response to a request from the assistant superintendent's office that a special course of study be established in one of the Mexican neighborhood schools. The outline takes into consideration the adaptability of the Mexican in making useful and decorative objects and places special emphasis on the decorative handwork feature of the manual arts work.

Establishment of the Course.

The course was begun in the Macy Street School under the direction of Mrs. Grace Stanley, special agent of the California State Board of Education. In the course, the designing and construction of the types of objects enumerated are considered so important that each group of projects is called a craft. These projects taken together form a large part of a very extensive knowledge of business and manufacture.

In the outline developed by Mr. Kunou, the main idea of the handwork as involved in manual training comprises the following elements: Use value, art value, vocational value, avocational value and commercial value. "These values taken as a whole form what is termed an educational value and any exercise, project or model which, when analyzed, possesses these values, is called an educational project. The educational is the real, and therefore the highest code in school activities, because it is the all-inclusive and the final."

Synopsis of Activities.

"The synopsis which comprises eight different crafts is as follows: 1, box craft; 2, candle holder and book end craft; 3, furniture craft; 4, lantern craft; 5, leather craft; 6, picture frame craft; 7, tile craft; 8, toy craft.

"**Box Craft.** The making of all kinds of boxes, singly, or by the dozen or hundred, is accomplished by using jigs and various other contrivances for the cutting of stock and the rapid assembling processes, mass-smoothing and mass-sanding of material. Such articles as vanity boxes, jewelry boxes, knife-and-fork boxes, stationery boxes, file-card boxes, toy banks, ditty boxes, and the like are attempted, which when finished, can be sold.

"**Candle Holder and Book End Craft.** The making of all kinds of candle holders, book ends, door stops, and other notion articles, such as decorative coat hangers, flower and garden stakes, all of marketable quality.

"**Furniture Craft.** The furniture craft provides for the making of various kinds of small, useful and ornamental pieces of furniture, such as stools and chairs with upholstered and woven tops. The making of clock cases, fancy taborets, pedestals, tie racks, etc., is also attempted because of their marketable features.

"**Lantern Craft.** The making of all sorts of lanterns, such as decorative paper lanterns, wood lanterns, sheet metal lanterns, papier mache lanterns, newel-post and porch lanterns, is carried out also because of marketable features. The lanterns afford splendid opportunities in design, construction and finish. The work includes the handling and coloring of silk, paper and other transparent materials for obtaining beautiful lighting effects.

"**Leather Craft.** This craft includes the making of belts, pocket books, coin purses, music rolls, portfolios, and vanity cases, all of marketable quality and constructed in both artificial and better grades of material. The craft also includes work on machinery as well as fine handwork.

"**Picture Frame Craft.** This craft provides for the making of all kinds of picture frames, from the cutting out of the frame in a single piece, to the most complex form of picture frame molding.

"**Tile Craft.** The making and casting of various kinds of plaster paris plaques for ornamental purposes is carried out both in the colored polychromatic designs and otherwise. The making and casting of colored cement tiles, toys, and cement pottery is attempted, together with practice in the use of various magnesite materials.

"**Toy Craft.** The making and coloring of all kinds such as toys in wood, stationary toys, moving toys, mechanical contrivances, is taught because of the marketable quality of the articles constructed. This class of objects is almost limitless in scope.

"**Chores and Repairs.** In this group there is provided opportunity and material for various kinds of chores for school and home. These may be attempted where an absolute need exists for their use.

Supplementary Instruction. The synopsis in actual practice provides instruction in the processes of handling and treating materials, laying out work, construction and assembling procession. It also includes instruction in the handling of the various finishing materials such as stains, varnishes and the like, the producing of gloss effects and the reducing of gloss to mat effects. The painting and enameling processes, including priming enamel coating, colored enameling, gilding, bronzing, and silvering of wood, metal and plaster paris objects are also taught. Further instruction is included in the study of material used in actual processes of this character, and in the mixing and making of the materials and combinations of materials; in the making of ornaments of composition, the attaching and coloring of these on the objects; in the study of color, mixtures and proportions; in the mensuration and computation of the amount and cost of materials; in the composition of materials, their manufacture, quotations, market opportunities, manufacture and labor opportunities; in a study of the various commodities, their scarcity or abundance in the market; in the making of specification drawings and designs; also individual work, group work and mass construction of projects."

HOME ECONOMICS IN ILLINOIS.

The educational press bulletin, issued by the Illinois state department of public instruction urges a keener interest in the home, skill in the ordinary household operations, and habits of right living and ideals of good American family life. In line with this objective it presents the following:

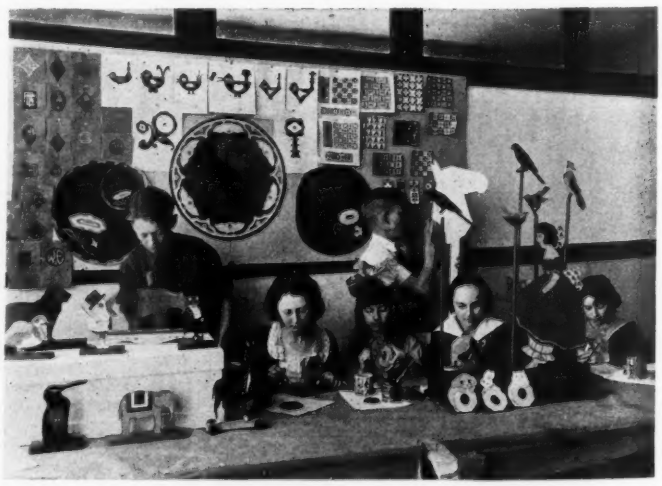
The home project should be defined in terms of (A) objective, (B) place, (C) characteristics.

(A) The objective is the contact of the student with home problems of considerable extent under conditions as nearly normal as possible for the purpose of supplementing the school's instruction and making it distinctly practical.

(B) The student's own home is a very desirable place for this work if conditions there offer suitable opportunity. Other homes or places approximating home conditions, or offering opportunities for the solution of educational problems in any phase of home-making may be selected.

(C) The characteristics of the home project are:

1. The genuine need, apparent to the student, exists for the solution of the problem.
2. The student has the preparation for attacking the problem.
3. The problem has potential educational values in
   a. Standards of manipulation
   b. Initiative
   c. Managerial ability



CLASS IN DESIGN MAKING TOYS AT LAKEVIEW SCHOOL, OAKLAND, CALIF.

d. Results which can be evaluated.

The following principles should guide the development of the home project in home economics.

(A) The Home Project should grow out of and be intimately related to school instruction, therefore,

1. Preparation should be made in school for the work.
2. The amount of credit will depend upon the relative value of this portion of the course.

(B) Supervision by the teacher and by the parent or other person is essential. The means of obtaining this supervision must depend upon local conditions, and will be decided in part by the effect of the supervision upon the future development of the work.

(C) Home Projects should be selected upon the basis of :

1. The relative contribution of each project in the preparation of the homemaker.
2. The relation of each successive project to the entire range of duties of home-makers in general and of home-makers in the local community in particular.

The teacher and student should keep in mind when selecting a project that it should be first of all an "educational job" and that it should be considered just as much a part of the school activities as any other part of the student's work. The home project should never be an assignment by the teacher, it should be a selection by the pupil in conference with the teacher or better still a selection by a committee composed of the girl, her mother and the teacher. The teacher should have prepared a list of suggestive projects in several of the various phases of Homemaking activities. The girl should select such project or projects as will best fit her needs.

After the project has been selected the girl should work out a plan for her project which should include a statement of its aim or purpose and why she has chosen this project; what she must know and do in order to accomplish her purpose and what books, bulletins, tools, materials and furnishings will help her. She should then submit her plan to her teacher for advice and suggestion. while working out the project the girl should keep a working note book recording progress and results. This notebook should not be filled with useless detail or be used simply as a place for recording deeds for the teacher's inspection; it should contain suggestions, references and a record of results that will truly help the girl in her work.

When the project is completed the girl should make a brief final report which should usually contain the following items:

1. What was the purpose of your project?
2. Give very briefly your method of working out this project.
3. What difficulties did you have and what helped you solve these difficulties?
4. What new things have you learned?
5. What would you do differently and why if you were doing this work another time?

All activities of the home which deal with food, clothing, home management, care of children, home nursing, laundering, the yard, garden and recreation offer opportunity for project work. They will vary as to the time required for completion, the skills and informations needed in working them out but every project should be a normal unit of work such as may be found in the homes of the community. The project should afford the girl an opportunity to gain new knowledge and skill in working out a real problem as well as an opportunity for doing a piece of productive work. The following list of projects are suggestive of the type of projects that may be offered to high school girls.

A. Food preservation projects.
1. Canning family supply of vegetables.
2. Canning family supply of jelly, jam, preserves, etc.
3. Canning for family one dozen quarts of tomatoes, peaches, pears, plums, etc.
4. Vegetable drying for family.
5. Storing family supply of eggs by water glass or other method.

B. Food preparation projects.
1. Preparing and serving three to five different breakfasts, dinners or suppers.
2. Preparing and serving of farm dinner for threshing, haying season, etc.
3. Making of pies or cakes for family for three or four weeks.
4. Making of yeast bread.
5. Study of student's own diet for a given period of time.
6. Preparing and serving of meals on Saturday and Sunday.
7. Preparing and packing of school lunches for two or three weeks.

C. Clothing projects.
1. Upkeep of clothing for family (three or four weeks.)
2. Darning for family (three to six weeks).
3. Renovation of dress.
4. Renovation of clothes for small brother or sister for summer.
5. Making of undergarments for summer.
6. Making of school dress.
7. Making of sport suit or dress.
8. Making of party or commencement dress.
9. Making of curtains, draperies, table linens or other household articles.
10. Baby layette.
11. Men's or boy's pajamas.
12. Making set of slips for furniture.

D. Houshold management projects.
1. Cleaning and storing of winter garments.
2. Care and storage of stoves for summer.
3. Care and cleaning of cellar or basement.
4. Cleaning and care of yard.
5. Personal accounts for three months.
6. Laundering of woolen sweaters.
7. Care of second floor of detached house.
8. Refinishing woodwork in bedroom, living room or kitchen.
9. Refinishing of floors.
10. Weekly laundering of girl's own clothes or for family.
11. Entire care and management of household.
12. Home accounts of girl's own home (with inventory.)

E. Child care projects.
1. Bathing and dressing of baby.
2. Preparation of food and feeding of child of one to two years for one week.
3. Preparation of food and feeding of two to four years for one week.
4. Entire care of two or three children, bathing, dressing, feeding and playing for one week.
5. Care of child's laundry for one week.

F. Yard or garden projects.
1. Small mixed vegetable garden.
2. Flower garden of various kind.
3. Poultry yard.
4. Window boxes.
5. Vines for porch or fence.

G. Sociability or recreational projects.
1. Small dinner party.
2. Tea party.
3. Parties with stunts as center.
4. Dancing party.
5. Porch or veranda party.
6. Birthday party.
7. Luncheon or supper.
8. Shower party.
9. Assistant at mother's party.
10. One-night camp.
11. Party to celebrate some holiday.
12. Bacon bat.
13. Swimming party.
14. Hostess at club meeting.
15. Director amateur dramatics.

NEWS AND NOTES.

Vocational Conference. Dr. C. H. Lane and A. P. Williams, of the Federal Board of Vocational Education, Washington, D. C., met with representatives of the Pennsylvania Vocational Bureau and the department of rural life of the State College, for a three-day conference, May 7-9, at Harrisburg. The problems discussed pertained to agricultural education and state administration of rural community vocational schools and departments.

Occupational Study. One of the popular and beneficial courses offered this year at Reading, Pa., is one in occupational study. In using the occupational analysis, the pupils bring occupations such as plumbing, carpentry, cigar making, railroading, and telephone operating. The material has been very valuable to the instructor.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finish for Beech Wood.

344. Q: Please inform me if there is any stain or chemical that will stain or burnish beech wood. I have been informed that it cannot be used for furniture construction unless veneered or painted.—J. E. R.

A: Generally speaking beech is not an acceptable wood in the furniture industries except in so far as it may be used for backing and drawer sides in dresser cases and similar cases. Its exceeding hardness and marked tendency to warp or split make it a wood as hard or more so than maple. In addition it possesses ingrained material which rapidly dulls the cutting edges of surfacer knives and saws, thereby increasing the operating cost. The only place where it is used for face work is in medium grade flooring and meat market furniture as counters and butcher blocks. The great variation in color between sap wood and heart wood make it a difficult matter to produce an even tone of stain color. Should you, however, desire to experiment with a finish, the work should first be given a coat of tannic acid dissolved at the rate of two ounces per gallon of hot water. This has the effect of producing a better balance in the surface conditions, thereby enabling the following solutions to take hold evenly. Let dry and sand smooth, give a second coat of two ounces of bichromate of soda or potash dissolved in one gallon of hot water. Let stand over night in a hot room where upon the carbonic acid gas in the atmosphere will react with the chromic and tannic acids on the wood to develop a rich shade of brown. Great care must be exercised to make sure that at no time does either solution come in contact with either tin or iron, in which case a deep black will be produced in spots. Without sanding, the work should be given a coat of orange shellac made from stock material reduced with three volumens of alcohol. When dry this should be sanded smooth and if necessary any finish may be built up through the use of either lacquer or varnish as may be desired. Mahogany finishes can be obtained by using a mahogany stain as the second coat replacing the bichromate solution.—**Ralph G. Waring.**

Cedar Finishes.

361. Q: How can I finish P. O. cedar and red gum so that they will appear the same when both are used in a project? I am interested particularly in the walnut and mahogany finishes.—E. C. A.

A: In a town as famous as Rockford, Ill., the former center of the furniture world, you should have no difficulty whatever in securing water soluble walnut and mahogany stains. The use of P. O. cedar and red gum is a very unusual combination and should be avoided whenever possible, due to the fact that the resenous nature of the cedar makes it extremely difficult to match up with red gum. It would be far better to use all of one kind of wood, avoiding any attempt to mix such extremes in the same project. It is my belief that it will be necessary to coat the cedar portions and gum with a hot solution of two ounces of tannic acid and one gallon of boiling water. The work should then be dried and carefully resanded and may then be given a coat of either mahogany or walnut stain as may be desired. Any inequalities in the color especially in the cedar, may be shaded out by using dilute orange shellac which has been shaded either red or brown by the addition of a slight amount of Bismark brown, alcohol soluble or jet black water soluble aniline to produce either a red color or brown, as may be desired for the particular finish in hand. This work of shading out difficult portions in the factory is accomplished through the use of colored lacquer solutions applied with a spray gun, a method which enables the operator to perfectly match light and dark colored woods. Practice, however, with the thin, strongly shaded shellac and a soft short haired fitch flowing brush will often produce successful results. The whole piece should be lightly sanded with a split 6-0 paper and then may be given a coat of varnish which when thoroughly dry should also be sanded. A second coat should then be applied and when properly hardened should be rubbed with pumice stone, felt pad and water, since the modern mahogany and walnut finishes are very thin as to body and dull as to finish.—Ralph G. Waring.

ART CLUBS IN SCHOOLS.

Art clubs have come to occupy an important place in a number of school systems of the state of New York, in some of which membership is limited to pupils in the traditional four-year high school while in others it is limited to junior high school pupils. The schools of Schenectady, New York, Rochester and Yonkers are among those which have shown particular interest in art clubs.

The Art Club of Schenectady High School was organized in 1915, having as its purpose, the study and promotion of interest in all branches of art. Students receiving the highest grade in art courses, who have not failed in any other subject, are eligible for membership, which is limited to 25. The election of members takes place at the close of the first and second terms. The club meets each Monday afternoon.

The objects of the School Art League of New York City includes provisions for lectures to public-school pupils and teachers, the awarding of a number of art school scholarships, the conferring of medals for excellent work in drawing, design and craftsmanship to public school pupils, and the maintenance of Saturday classes in drawing. Its present membership is about 4,000 junior members, each of whom pays ten cents a term; and 224 annual members who contribute from $5 to $100 toward the work of the league.

In the junior high schools of Rochester, each art teacher is held responsible for the conduct of one of the art clubs which are made up largely of pupils interested in the crafts, although there are other clubs composed of pupils whose interest centers in oil painting and pencil drawing.

The Yonkers High School conducts flourishing art clubs, the Sketch Club founded in 1918, and the Cartoon Club founded in 1920, and a third is planned at the present time. Membership in the clubs is limited to thirty, and meetings are held each Friday. In the fall, the organization concentrates on pencil sketching out-of-doors. Winter work includes poster designing, pen and ink illustration and the designing of covers, decorative head and tail pieces, and bookplates. The best work turned out by the clubs is printed finally in the **Aegis**, the school paper, and in the **Blackboard**, the senior class book. The organizations are conducted almost entirely by the pupils. Accurate record of attendance is kept, and credit for work satisfactorily done is given in the art academic course under the title of advanced representation.

Recently there appeared in the **Blackboard**, a title page design for the business department, and similarly in the Aegis, there appeared a commencement cover design. In addition to the work suggested, the organizations are also active in various civic enterprises. Last year considerable attention was given to the promotion of the "own your home" campaign conducted by the Yonkers Chamber of Commerce.

CONSTANTLY GROWING IN VALUE.

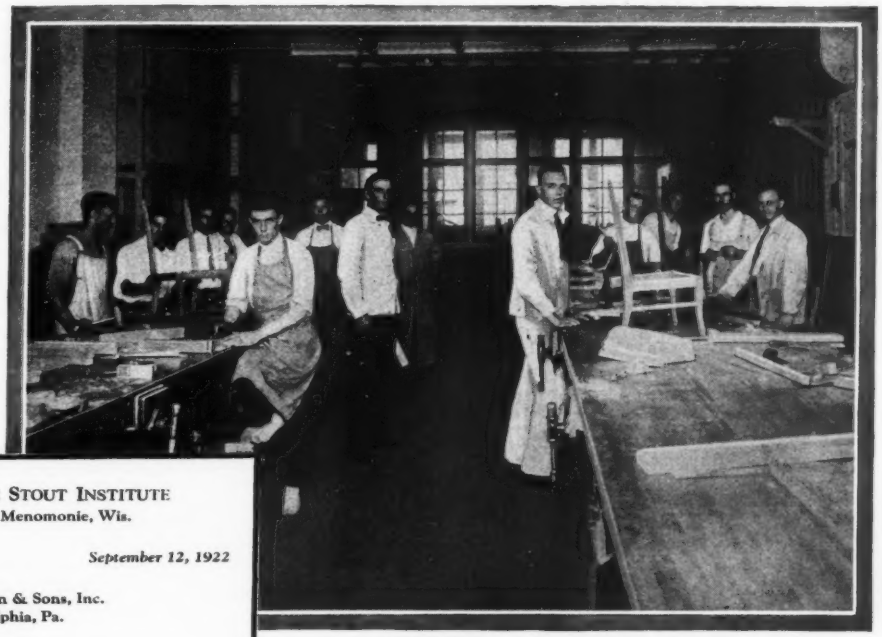
The editors of the Industrial-Arts Magazine are receiving most pleasant evidence of the appreciation in which subscribers hold the Magazine. Thus, in a letter received recently from an Ohio teacher of manual training, he says the following:

"This is my tenth subscription to your Magazine and I have every copy published since its beginning, save one, that being February, 1914. I wonder if any other subscriber can make this same report?

"I have a wealth of material here that it would be impossible to go into the market and purchase. Wishing you continued success, I remain

Mr. J. Lawrence Wheeler, of Hastings, Neb., has accepted a position as director of the industrial arts department of the State Teachers' College, Edna, Okla. Mr. Wheeler is a graduate of the State Teachers' College, Pittsburg, Kans.

Better Work



Workshop of The Stout Institute, Menomonie, Wis.

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September 12, 1922

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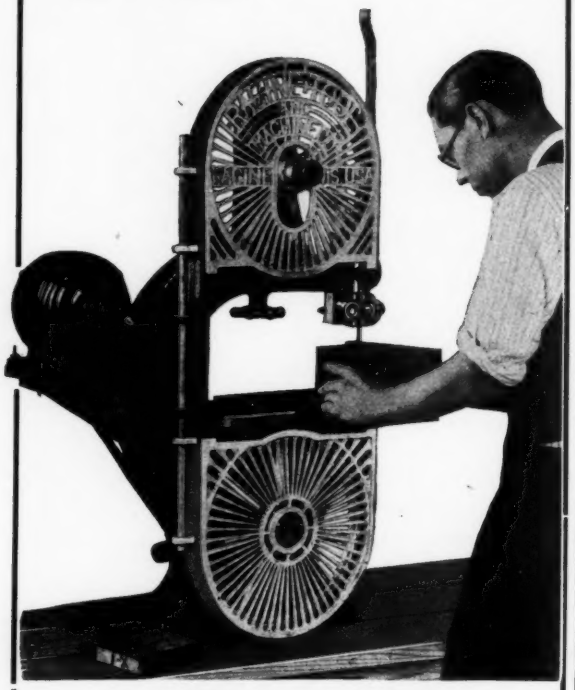

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NEWS AND NOTES.

Home Economics Work. In the Township Joint High School, at Burgettstown, Pa., the second-year class in foods is divided into groups of three for meal preparation and food service. Each group is assigned a day on which a luncheon and dinner are to be served. The meals are planned, the market order made and handed in one week before the date of serving. The meal is served in simple family style with the waitress seated at the table. Although the teacher is always present, the girls are responsible for each detail of the work so that they obtain practical instruction in the preparation and serving of a meal, also in laundering and keeping of household accounts.

Teacher Training. In accordance with a custom of the past four years, the seniors of the vocational home economics teacher-training department of the Pennsylvania State College spent the first six weeks of the second semester in home economics schools and departments. In all, fifteen schools were selected as practice teaching centers for the teachers.

Industrial Education. Smith-Hughes students in the high school at Williamsport, Pa., have designed and made apparatus for an electrical testing laboratory. A number of other pieces of machinery have been made including a sensitive drill press, a pattern maker's lathe, an arbor press, a centering machine, and a machine floor truck.

Construct Box Trays. Fourteen hundred box trays have been made for the home economics department at Bethlehem, Pa., by the boys of the seventh and eighth grades and the carpenters of the trade school.

Build Shaper. The students of the machine shop at the technical high school, Harrisburg, Pa., have built a nine inch shaper from drawings and castings purchased from a Cincinnati firm. The pattern show made patterns for the smaller parts and larger patterns were held over until the certain machines worked satisfactorily.

Shop Conference. Fifteen shop teachers from junior and senior high schools met at Harrisburg, Pa., for the purpose of building up courses in shop work. Group meetings are to be held according to a pre-arranged schedule.

Industrial Motion Picture Film. "The Story of the Gasoline Motor" is the title of the latest issue of a series of industrial motion picture films prepared by the Pennsylvania Department of the Interior. The film visualizes in a graphic manner the complete operation of a gasoline engine. Special views are given to show the cyles through which the gas travels from the time it enters the engine until the time it leaves the engine as a burned gas. Copies of the film may be borrowed for educational purposes by addressing the department of the interior, Bureau of Mines, Pittsburgh, Pa.

Course in Agriculture. A course in vocational agriculture has been introduced at Mt. Pleasant, Tex.

Fourth Anniversary. The fourth anniversary of the establishment of the Brooklyn Continuation School, at Brooklyn, N. Y., was celebrated at a luncheon held during the week of May 20th. The school was established in 1919 with 800 pupils and today nearly 5,000 boys and girls make up the student body. In the last four years 17,000 juvenile workers have received instruction in the institution and the average attendance for the last month has been around 74 per cent. The teaching staff has grown in this time from seven to 33 teachers.

Graduation Exercises. The division of vocational education, University of California, held the third graduation exercises for the class completing the 280-hour evening course for teachers on June first, at the University Hall. Fifty-one who had completed the requirements for the teacher's course were given diplomas. Since the course was established four years ago, 191 men and women have completed the 280-hour requirement and most of them are now teaching trades or vocations in the California vocational schools.

Vocational Students Graduate. Four vocational students were graduated from the Harding High School, at Marion, O., on June first. The boys were cooperative students for one year under an arrangement with local manufacturing companies. During the period of training they received the sum of fifty per cent, in addition to earnings received from the local companies. At the exercises, each boy received a bankbook in which was entered the amount of his earnings with the companies.

Automobile Repair Course. A course in automobile repair has been introduced in the high school at Joplin, Mo. The department will be operated as a vocational

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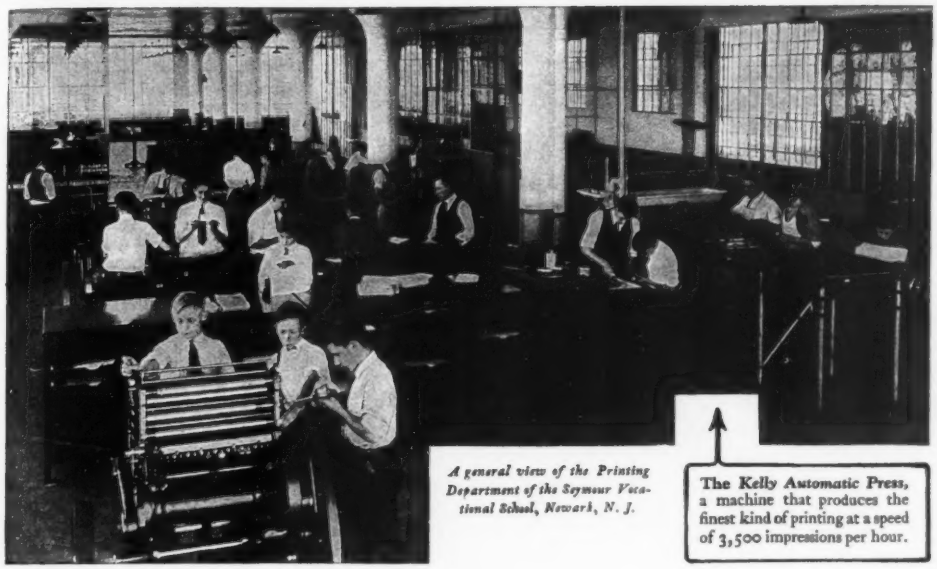

A general view of the Printing Department of the Seymour Vocational School, Newark, N. J.

The Kelly Automatic Press, a machine that produces the finest kind of printing at a speed of 3,500 impressions per hour.

Printing + Interest = Education

THE PRINT SHOP OF THE SEYMOUR VOCATIONAL SCHOOL, NEWARK, N. J., is not shown for the sole purpose of showing you the equipment, although you are probably interested in such equipment, but there is a greater significance in the picture. Note the interest of these future printers in their work. So great that not a boy even looked at the camera. They are printing their school paper, a beautiful twenty-four page booklet.

Boys, the sizes and ages shown, are not interested in a subject that doesn't appeal to them. Printing fascinates most boys. It teaches them the use of punctuation marks, the making of proper margins, the use of good English, correct spelling, capitalization, and indention in an accurate manner.

School Printing Outfits are inexpensive. They are designed for manual training, pre-vocational, vocational, trade, journalistic laboratory, and the four-activities-in-one-room types of instruction. The smallest school communities and all other types of schools to the the largest universities are installing printing.

Write to-day and ask for information regarding the printing outfit designed for the phase of education in which you are particularly interested. For personal attention, address it to:

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(Continued from Page XX)

course under the Smith-Hughes law and will be in charge of an expert instructor.

Increase in Agricultural Students. A large increase in attendance in agricultural schools operating under the federal education act of 1917 has been reported in statistics covering the first five-year period. The enrollment has increased from 15,453 in 1918 to 59,276 at the end of the year 1922. This is an increase of nearly 300 per cent for the period. The number of schools has increased from 609 in 1918 to 2,175, and the number of teachers from 895 to 2,290. The states last year expended more than $4,000,000 on vocational agricultural schools, of which amount about $1,400,000 was received from federal funds.

Smith-Hughes Vocational Class. A Smith-Hughes vocational class has been contemplated for next year at Owensboro, Ky. The class is intended for children of junior high school age who are backward in school work and the instruction is to be suited for vocational training.

Salary Changes. The school board at Worcester, Mass., has increased the maximum salary of manual training teachers in grades seven and eight from $2,375 to $2,475 per annum. The maximum for women teachers in continuation schools has been increased from $2,000 to $2,100, and the minimum from $1,250 to $1,350. The maximum salary of the head clerk at the continuation school has been fixed at $1,350 per annum.

Open Printing School. The Baltimore School of Printing, a memorial to Ottmar Mergenthaler, opens its doors to students on September 10th. The school is the outgrowth of the best thought and effort of the Baltimore Typothetae and the Board of School Commissioners.

The building which is centrally located is within easy access to students from all sections of the city. It is furnished with modern and up-to-date machinery and shop equipment, the estimated value of which is $50,000. The equipment includes five linotype machines, two monotype casters and five keyboards, one Optimus press, one Kelley press, one Miehle press, two Chandler and Price presses, one Seybold cutting machine, one folding machine, one Latham stitcher, and a complement of cabinets, stands, tables, benches and other printing necessities.

The school offers a reading and reference library of available books dealing with the several branches of the printing industry. It is supplied with current literary and technical magazines, also samples of high-grade printing.

The school is open to boys who have completed the eighth grade of the public schools or equivalent. While preference is given to students 14 years of age or over, those of less than that age are not debarred if they have completed the eighth grade.

The course of training covers a period of five years arranged as follows: First and second years, full time in the school; third and fourth years, half time in school and half time in the shop (alternating periods); fifth year, full time in the shop. Standard apprenticeship lessons prepared by the education department of the Typothetae constitute the course of study. The lessons are arranged in nineteen separate groups, each group being broke up into two or more units. The units are further broken up into eight or more lessons. Each day's work is divided into practical shop work and related instruction in academic subjects. The school year consists of three terms of fifteen weeks each, with a vacation period between each two terms.

After the second year of the course, the student divides his time between the school and the shop and for this he is paid a reasonable wage. The allowance increases during the third and fourth years, and beginning with the fifth year, when the student enters upon full-time employment, he receives a wage of about three-fourths of the normal wage in the industry.

A diploma is awarded to each student for the successful completion of the five years' course and a journeyman card is given each employee at the age of 21, provided he has received his diploma.

At Cleveland, Ohio, vocational guidance is carried on through formal class work in some schools, group counseling, individual counseling, visits to industries, talks by business men and women, and by informational occupational material furnished by the central office. Individual development is furthered by well directed student activities, and in one high school the vocational counselor supervises student organization through the faculty advisers.

Build Screens. The school department at Manchester, Mass., has taken every precaution to prevent the spread

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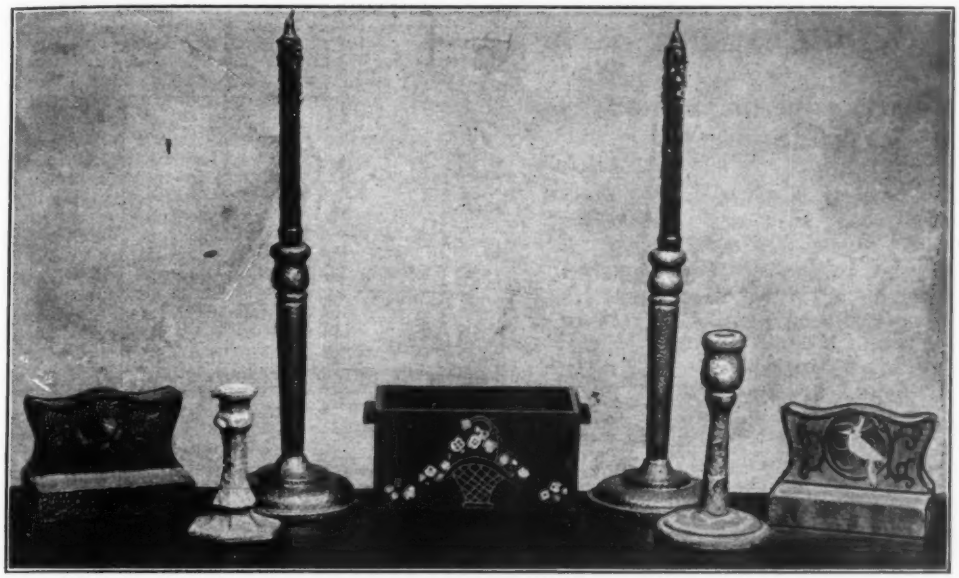

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GESSO decoration is a revival of an ancient European art, and is now widely used to secure color relief decorations. Bradley's Gesso—the finest made!—is supplied in 2-oz. jars, ready for use. The colors are: Rose, Scarlet, Tangerine, Melon, Mineral Green, Robin's Egg Blue, Cadet Blue, Green, Slate and Black. Price per 2-oz. jar, 25 cents.

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This is an ideal composite clay, designed for use in school modeling. It requires no mixing, is always ready for use, never hardens, and may be used repeatedly. Supplied in various colors.

Price per package, 45 cents.

BRADLEY'S MODOLITH

This modeling material is pliable as wax, but sets as permanently as bronze. It requires no firing, and will not crack. It is supplied in four colors.

Price per can, 50 cents.

BRADLEY'S CEMENTINT

This is the original colored cement mixture for producing vases, candlesticks, bird baths, and various craft creations. Nothing to add but water. It is offered in nine colors.

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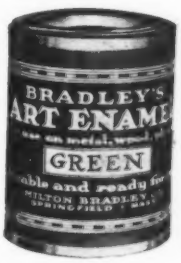
BRADLEY'S ART ENAMEL

Air-Drying 15 Colors Waterproof

The vogue for brilliant color decorations is now the dominant note in industrial art. Bradley's Art Enamel meets the demand for a permanent, glossy, quick-drying color medium. It may be applied to wood, glass, cardboard or metal. The colors are opaque and may be superimposed. No firing necessary.

Price, 30 cents.



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Building habits of clear thinking
—with school art
art stimulates self-expression
What art education means to your child

What five Saturday Evening Post messages have done for School Art

HERE are reproduced in miniature a series of five American Crayon Company school art messages which have appeared in The Saturday Evening Post during the last few months.

Reaching many millions of American Parents, these messages have served to create a better public understanding of the vital purpose of school art.

A growing appreciation of the practical value of this subject is evidenced by the many letters this company has received *from parents in every section of the United States*, following the appearance of each message.

These letters show more than a newly awakened interest. They show a desire to co-operate with the schools in advancing a subject which is so important to the child's development.

This growing spirit of co-operation is of untold value to school art, and should lend a decided impetus to its growth.

THE AMERICAN CRAYON COMPANY
ESTABLISHED 1835
SANDUSKY · OHIO · · · · · · NEW YORK

(Concluded from Page XXII)

of contagious disease. In connection with the carrying out of a health program, plans were made for screening all classroom windows to protect the teachers and pupils from the discomfort and dangers of flies.

Full-length screens were made for each window, at a cost of less than a dollar. The work was done by the boys of the manual training department as a means of economy to the school system.

The teachers have noted a great improvement with the placing of the screens. The children are quiet and happy, the room is clean and attractive and classwork is carried out more expeditiously. The project which has been so successful in Manchester has been offered to other schools as a means of making schoolroom conditions more attractive and comfortable in warm weather.

Annual Exhibit. The annual exhibit of the schools of Winfield, Kans., was held at the local high school building May 9th and 10th. Special programs were carried out by the pupils and teachers on two evenings with demonstrations of actual classwork. Among the exhibits of manual training work were farm mechanics, automobile mechanics, mechanical drawing, printing, art, and wireless construction. There were demonstrations in printing and cooking for the benefit of the visitors. About 3,000 people attended the exhibits and demonstrations.

Lectures on Art. A series of five lectures on art courses in public schools was given in the state of Virginia during the week of May 21st by Mr. Leon L. Winslow, specialist in art and industrial arts for the state of New York. Included in the itinerary of Mr. Winslow were the cities of Lynchburg, Farmville, Richmond, Hampton and Norfolk. The lectures were given under the auspices of the fine arts section of the Virginia Teachers' Association.

Graduation Requirements. The school board at Kingsport, Tenn., has made a requirement for graduation which is not usually made of high school students. The requirement is that each boy who graduates must have completed at least one year in mechanical drawing and one year in shopwork. Each girl similarly must have completed one year in cooking and one in sewing before receiving a diploma of graduation.

A Plastering School. The building contractors at St. Paul, Minn., have opened a plastering school with twenty students. The United States census figures for 1920 show that there has been a reduction of 19.8 per cent over 1910 in the number of men working in the plastering trade. The wage now paid to plasterers in Minnesota is $9 a day.

Vocational Students Graduated. A class of 125 students was graduated from the vocational high school at Minneapolis, Minn., on June 5th. The stenography department, with 27 students, headed the list with the number of graduates, followed by the class in practical nursing with 26 students. Diplomas were awarded to thirteen students in dressmaking, thirteen in millinery, seventeen in junior nursing, nine in salesmanship, three in multigraphing, two in bookkeeping, six in calculating machine operating, two in commercial cooking, two in telegraphy and one in office practice. The diplomas were presented by Mr. John N. Greer, assistant superintendent of schools, while the main address was delivered by Miss Alice Haley, state supervisor of home economics.

Construct House. The boys of the vocational department of the Utica Free Academy, Utica, N. Y., recently completed the erection of a house which they began last October. The house is believed to be the first in the state to be built by school boys, and the entire work of construction was carried out under the direction of special instructors. The work was divided into two groups, one group spending the whole day on the job, while the other group spent the same time in drawing and mathematics, the groups always alternating. The shop time which was one and one-half hours in length, was made to include enough constructive periods to make progress on the construction possible. In all 23 boys were engaged in the work, divided between electrical work, wood working, masonry and painting.

Vocational Conference. A three weeks' summer conference in teacher training and vocational education was held at the State College of New Mexico, beginning June 11th. At the conference, classes were held in the subjects of trade and industrial training, agricultural work, farm shop work and sociology.

How the Present Day Plane Came Into Being

The great inventive genius of Leonard Bailey

While back in the early ages it is apparent some sort of a plane was used, the earliest type with which we are familiar is the wooden plane.

The construction of this plane tended to make it heavy and cumbersome. The body was of wood, while the thick wedge-shaped cutter (a thin strip of steel welded to the back of wrought iron) rested on a wooden seat and was adjustable and held in place by a wooden wedge. It was necessary not only to hone but to grind the cutter to keep it in workable condition. Frequent sharpening of this kind was sure to alter the thickness and bevel.

It was clearly recognized that a plane with a thin steel cutter of uniform thickness and whose original bevel could be maintained would be the practical tool. But it was not until the middle of the nineteenth century that any development work took place.

Leonard Bailey, of Boston, realizing this need, undertook a series of inventions which culminated in a patent being granted him in 1858 for a plane with an adjustable cutter. Digging more and more deeply into the subject, Mr. Bailey finally conceived in 1867 a wood plane with an iron top. This was the forerunner of the adjustable wood plane of today.

To eliminate the tendency of jumping or "chattering," Mr. Bailey patented a cutter cap which made a second point of contact with the plane iron. This invention insured the use of a thin steel cutter.

Clearly appreciating the value of a thin steel cutter, he was always seeking ways and means of improving it. Believing that a wooden cutter seat in a wooden plane was not sufficient support to the thin steel cutter, he brought out a plane with an iron body and an adjustable iron cutter seat or frog.

(Continued in next issue.)

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of one of these, - or
of the plain B8, in
the tuck box?

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Catalog of Drawing Tables. The Economy Drawing Table & Mfg. Company, Adrian, Mich., manufactures a line of drawing tables which are used not only throughout the United States but also in foreign countries. Economy tables are so called, not because they are lowest in cost, but because of the service which they render over long periods of years.

A new catalog illustrating and describing all of the latest as well as the older and standard models of Economy drawing tables has been recently issued and will be sent to school authorities on request.

Teaching the United States Constitution. The Constitution of the United States, which every man should read periodically, is usually stowed away in books which are not always at ready command. E. C. Atkins & Co., of Indianapolis, Indiana, dug out this rare document out of its hiding place and presented it in handy booklet form for free distribution. This is a commendable service rendered in the interest of good citizenship. The booklet not only contains a complete text of the constitution, together with the several amendments, but also a definition of the bill of rights.

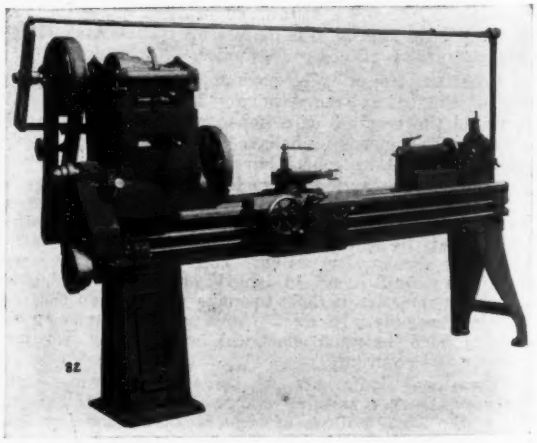
A New Under Swing Cut-Off Saw. The Oliver Machinery Company of Grand Rapids, Mich., which has for many years manufactured swing cut-off saws, is producing now the No. 96 high speed under-swing cut-off saw. It is operated with a foot treadle at the front, by which the saw is brought forward to cut off two inch material up to 22" wide or four inch material up to 16" wide. When the pressure is relieved on the treadle, a spring returns the saw instantly. The saw arbor can be locked in position for use as a rip saw, and by using the mitre gauge it will serve like the ordinary stationary arbor cut-off saw.

For ripping and mitre gauge work, it is accurate enough for the contractor and builder, but in schools it is not recommended for mitre work or ripping, and should only be installed in a manual training school where a variety saw bench is in use and where a cut-off saw is needed for cutting off lumber.

The machine is self-contained and compact, and is guarded with an adjustable saw guard. The table is cast iron 22" wide, 36" long, and 33" high. The two auxiliary tables, or extensions, are maple, fitted with two rollers each, and the right-hand section is fitted with a stop gauge and with three adjustable stops.

Floor space required is about 4'x10' and regular equipment includes 16" cut-off saw, two extension tables, back fence, stop rod with three stops, saw guard, dust chute, internal endless leather belt, self-contained countershaft with belt shift and necessary wrenches.

Issue Meat Charts. Armour & Co., Chicago, have just issued a handsomely lithographed chart, illustrating the relation of various meat cuts to the entire carcasses of the various meat-producing animals, and the reasons for the variation in costs of different cuts. The chart which is designed for use in home economics classes suggests various appetizing dishes that can be made from each of the cuts on the chart. The firm offers to send the chart free to any teacher of home economics who requests it.



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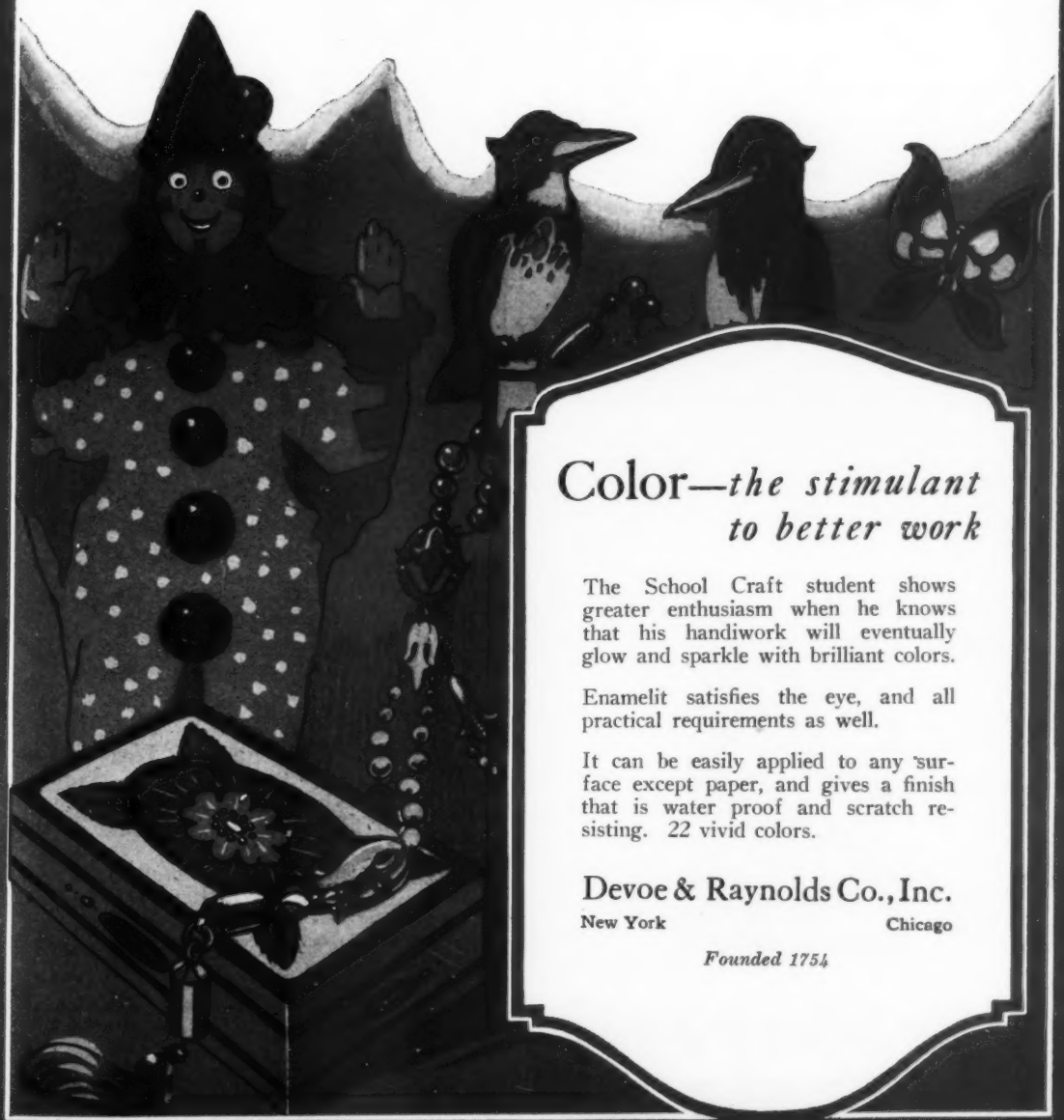

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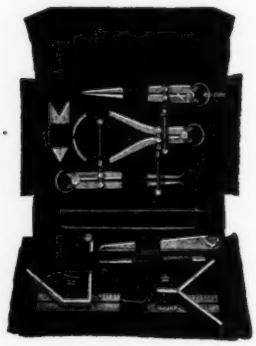

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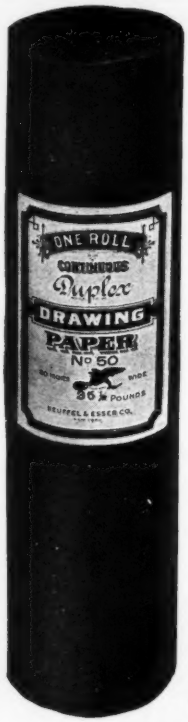

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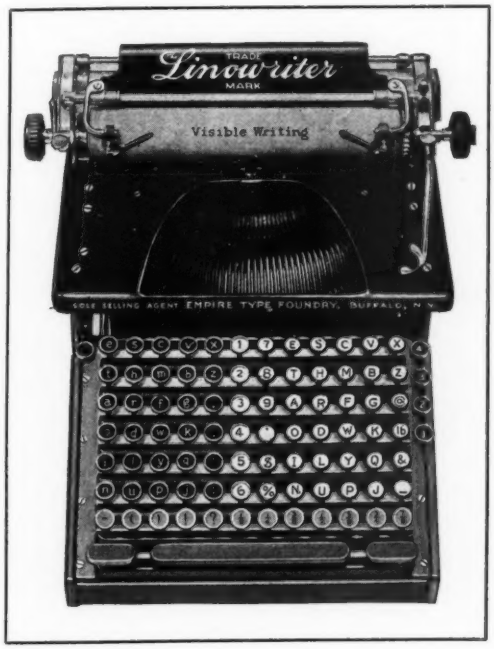

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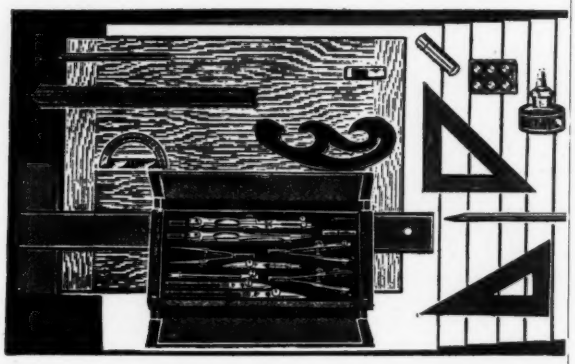

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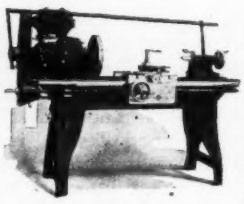

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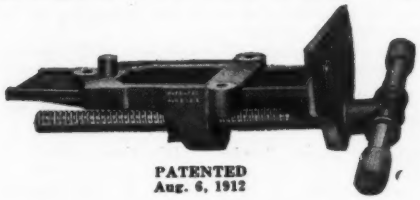

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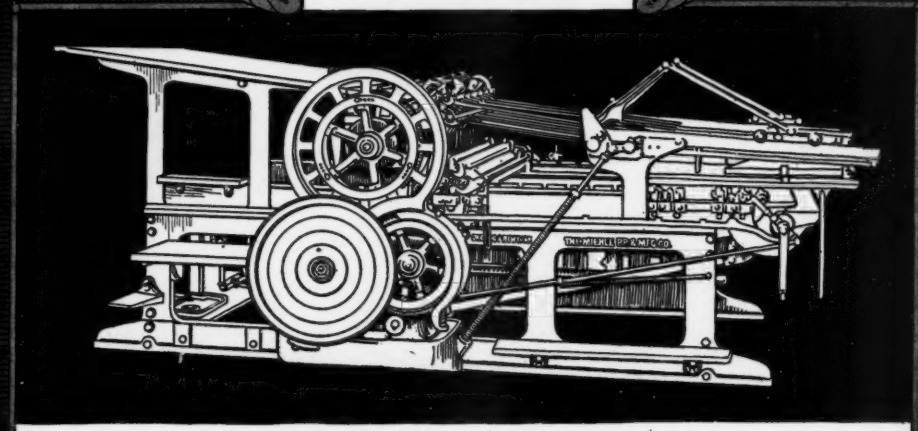

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